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ABSTRACT

These conference proceedings contain eight research papers on current findings, trends, and issues on health-related topics that have an impact on health occupations education. Presentations include "Update on Health Occupations Education" (Catherine B. Junge); "Reliability Considerations in Measuring Health Occupations Performance" (James Noel Wilmoth), an analysis of three reasons why reliability is a troublesome concept in educational research; "Types of Continuing Education Available Compared to Types Desired by Small Hospital Laboratory Personnel" (Shirley A. Baker); "Modular Competency-Based Geriatric Nursing Assistant Curriculum" (Dorothy M. Witmer), a report on a study to determine the essential components of a curriculum and development of that curriculum; "Changes in Health Care: Effects on Curriculum Revision" (Beverly Richards), results of a pilot study to examine essential behaviors of respiratory therapists and how and where those behaviors could best be learned; "Post-Secondary Health Occupations Students' Preferences for Accessing, Processing, and Judging Information" (Karen E. Gable); "Attitudes toward Disabled Persons as Perceived by Health Occupations Classroom Teachers" (Norma J. Walters, et al.); and "Nurse and Patient Relationship in B.S.N. Curriculum Development" (Elizabeth N. Stokes). (YLB)

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1st

NATIONAL

HEALTH OCCUPATIONS

EDUCATION

RESEARCH CONFERENCE

APRIL 11-13, 1986

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1ST
NATIONAL
HEALTH OCCUPATIONS
EDUCATION
RESEARCH CONFERENCE
PROCEEDINGS

APRIL 11-13, 1986

NORMA J. WALTERS, R. N., PH.D.
AUBURN UNIVERSITY

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AUBURN UNIVERSITY
AUBURN, ALABAMA 36849

NATIONAL HEALTH OCCUPATIONS EDUCATION RESEARCH CONFERENCE

SPONSOR: Auburn University

CO-SPONSORS: University of Georgia
Florida International University

IN COOPERATION WITH: Catherine B. Junge, R.N., Ph.D.
The Programs Branch
Division of Vocational Education
United States Department of Education

Health Occupations Education Division
of the American Vocational Association

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Introduction

The First Annual National Research Conference for Health Occupations Education (HOE) was an outgrowth of many discussions at conferences and meetings throughout the nation. Teacher educators as well as administrators and teachers expressed a concern for a special conference to share research papers and general information on current findings, trends and issues on health related topics which have an impact on HOE.

Health occupations personnel felt there was and would continue to be a need for many individuals involved in HOE especially those new to the field, to become active in HOE research and publication. In addition, graduate and undergraduate students are encouraged to attend to stimulate their interest in conducting research.

Each year during the research conference a session is planned for interaction among those attending to make suggestions for the next annual conference. Teacher-educators, teachers, administrators, or other personnel in or associated with health related occupations are encouraged to attend and participate.

Also, it was recommended to conduct sessions on informative topics of interest such as selecting research topics, preparing manuscripts, reliability of instruments, major problems encountered or observed in conducting research and grantsmanship. Other topics are also included as the need arises. Masters thesis as well as doctoral dissertations are considered for presentation. In addition, presentations from other disciplines may be invited to present topics of interest to participants.

Auburn University sponsors the national research conference each year and requests co-sponsors to assist. The Conference may be held at different locations each year. The 1986 sponsors were Auburn University, The

University of Georgia, and Florida International University, in cooperation with the United States Department of Education, Programs Branch, Division of Vocational Education and the Health Occupations Education Division of the American Vocational Association.

During the post conference session, a schedule for 3 years in advance is planned; dates, locations, sites and agendas are developed. Colleges, universities and other educational institutions are invited to volunteer to serve as co-sponsors.

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CONFERENCE AGENDA

NATIONAL HEALTH OCCUPATIONS EDUCATION RESEARCH CONFERENCE

Location: George C. Wallace
Center for Vocational and Adult Education
College of Education
Auburn University
Room 107 (Auditorium)

Date: April 11-13, 1986

FRIDAY, APRIL 11, 1986

2:00 - 5:00 p.m.	Registration - Center for Vocational and Adult Education
7:00 - 7:45 p.m.	Opening Session
Welcome	Norma J. Walters. R.N., Ph.D. Assistant Professor and Coordinator Health Occupations Education Auburn University
Topic: "Auburn University and the College of Education"	Jack E. Blackburn. Ed.D. Dean. College of Education Auburn University
Topic: "The Center for Vocational and Adult Education and Educational Program Areas"	Richard A. Baker. Ed.D. Professor Director of Center and Head Department of Voc/Adult Education
7:45 - 8:15 p.m.	Presenter
Topic: "Update on Health Occupations Education"	Catherine Junge. R.N., Ph.D. Program Specialist Health Occupations Education U.S. Department of Education
8:15 - 9:30 p.m.	Presenter
Topic: Reliability Considerations in Measuring Health Occupational Performance"	James Wilmoth, Ph.D. Associate Professor Foundations of Education Auburn University

SATURDAY, APRIL 12, 1986

8:30 - 9:15 a.m.	Presenter
Topic: "Multi-competent Allied Health Professionals: Current Approaches and Suggestions for Baccalaureate Level Programs"	Richard Bamberg, MT (ASCP), Ph.D. Associate Dean School of Nursing and Allied Health Tuskegee University

9:15 - 9:45 a.m.

Presenter

Topic: "Types of Continuing Education Available Compared to Types Desired by Small Hospital Laboratory Personnel"

Shirley Baker, M.T. (ASCP), Ph.D.
Assistant Professor
Health Occupations Education
Southern Illinois University

9:45 - 10:00 a.m.

Reaction to Research

Anna P. Reynolds, MT (ASCP)
Assistant Professor
Medical Laboratory Technology
Auburn University

10:00 - 10:15

Break

10:15 - 10:45

Topic: "Modular Competency-based Geriatric Nursing Assistant Curriculum"

Presenter
Dorothy Witmer, R.N., M.S.
Coordinator
Health Occupations
Boise School District
University of Idaho

10:45 - 11:00

Reaction to Research

Shirley Baker, MT (ASCP), Ph.D.
Assistant Professor
Health Occupations Education
Southern Illinois University

11:00 - 11:30 a.m.

Presenter

Topic: "Changes in Health Care: Effects on Curriculum Revision"

Beverly Richards, R.N., Ed.D.
Assistant Professor
Health Occupations Education
University of Iowa

11:30 - 11:45 a.m.

Reaction to Research

Mary Thompson, Ed.D.
Assistant Professor
Vocational Education
Auburn University

11:45 a.m. - 1:30 p.m.

Lunch

1:30 - 2:00 p.m.

Presenter

Topic: "Postsecondary Students Preferences for Processing Information and Decision-making"

Karen Gable, RDH, Ed.D.
Assistant Professor
Indiana University

2:00 - 2:15 p.m.	Reaction to Research
	Mary Street, Ed.D. Assistant Professor Vocational Education Auburn University
2:15 - 2:45 p.m.	Presenter
Topic: "Attitudes Toward Disabled Persons As Perceived by Health Occupations Classroom Teachers"	Norma Walters. R.N., Ph.D. Assistant Professor James Wilmoth, Ph.D. Associate Professor Auburn University
2:45 - 3:00 p.m.	Reaction to Research
	Beverly Richards, R.N., Ed.D. University of Iowa
3:00 - 3:15 p.m.	Break
3:15 - 3:45 p.m.	Presenter
Topic: "Nurse and Patient Relationship in BSN Curriculum Development"	Elizabeth Stokes. R.N., Ed.D. Assistant Professor School of Nursing Auburn University
3:45 - 4:00 p.m.	Reaction to Research
	Janice Sandiford, R.N., Ph.D. Associate Professor Health Occupations Education Florida International University
4:00 - 4:45 p.m.	Presenter
Topic: "Problems Researchers Encounter in Publishing"	Hollie B. Thomas. Ph.D. Professor and Coordinator Vocational Education Department of Educational Leadership Florida State University
4:45 - 5:00 p.m.	Closing Remarks
	Elizabeth Milliken. R.N., Ed.D. Assistant Professor University of Georgia
5:00 p.m.	
Tour of Center for Research, Teaching and Extension	Richard Baker. Ed.D. Director

SUNDAY, APRIL 13, 1986

Research in Progress	Individuals and Institutions
Preplanning for Second National HOE Research Conference, 1987	Betty Milliken, R.N., Ed.D. Associate Professor Health Occupations Education University of Georgia - Recommendations - Co-sponsors for 1987 - Location for conference
Recognitions and Awards	Janice Sandiford, R.N., Ph.D. Associate Professor Health Occupations Education Florida International University
Evaluation	Co-sponsors
	Janice Sandiford, R.N., Ph.D. Elizabeth Milliken, R.N., Ed.D.
Closing Remarks	Norma Walters, R.N., Ph.D.

RESEARCH PAPERS

Update on Health Occupations Education

Catherine Bickle Junge, R.N., Ph.D.

Program Specialist

Health Occupations Education

U.S. Department of Education

Washington, D.C.

(202) 732-2427

Update on Health Occupations Education

Catherine B. Junge

Abstract: This report is an update on trends and issues in health occupations education (HOE). A valid update must be based on accurate information. Information was acquired by the Health Occupations Education Specialist, U.S. Department of Education (ED) from three principal sources: sources outside the ED, sources within ED generated by the HOE Program Specialist, and from the Vocational Education Data System (VEDS). Sources outside ED consisted of other federal government departments and agencies and professional associations. Information generated by the HOE Program Specialist came from quarterly telephone conferences with HOE State Supervisors, conducted on a regional basis. VEDS information dates from 1966 to 1983.

A perception of trends and issues developed from the information sources cited. The need for health care workers is expected to increase. Technology is being incorporated into the health care system, causing many changes. Efforts at health care cost containment are the basis for alterations in the delivery system and employment of health care workers, e.g. practical nurses. Secondary HOE programs are affected by an overall drop in enrollment and a change in emphasis for secondary vocational education. Several sources for funding research are identified.

Washington DC, as the nation's capital, attracts many visitors throughout the year. Many tourists come to attend seasonal activities such as the Cherry Blossom Festival and the 4th of July Celebration. Others come to visit the units of the Smithsonian Museum Complex: the Air and Space Museum, the Art Centers and the Museum of Natural History. Many are attracted because Washington is the seat of the nation's government. Others come because of the historical significance of the surrounding area: Maryland, Virginia and Pennsylvania. Area historical sites date from the Colonial Period, through the Revolutionary War Period, up through the Civil War Period. Persons interested in family history are attracted to downtown Washington due to the presence of the National Archives Building. This facility offers tremendous resources for researching family history, as well as the nation's history.

It is possible in Washington DC to gather information, not only of a historical nature, but also related to national and international health care. Available information relates to the current status of the health care system and the way in which health occupations programs at the vocational and technical levels are preparing students to be providers in this system. This report will describe sources of information used by the HOE Specialist to identify trends and issues in health care education. These trends and issues are listed along with areas of "critical concern."

Washington DC could be called the "information center of the nation." It is the center for the judicial, legislative and executive branches of government. The executive branch includes the President, his advisors and many governmental agencies involved in health care and education. Three sources in this arena yield valuable information: (1) those outside the Department of Education (ED), (2) those inside ED generated by initiatives begun by the Health Occupations Education (HOE) Specialist, and (3) those inside ED related to the Vocational Education Data System (VEDS). Three categories of information have been gleaned from these sources: enrollment in health occupations programs, trends and issues in HOE and sources for research funding.

Information from outside ED comes from other federal agencies and from professional associations. Among the federal departments concerned with education of technical health care providers are several divisions of the Department of Health and Environment (DHHS): the Divisions of Nursing and Associated and Dental Health; the Office of Disease Prevention and Health Promotion; the Health Care Finance Administration; and, the National Institutes of Health. Other federal departments and agencies concerned with this topic are: the Departments of Labor, Defense and Transportation; the Veteran's Administration; and the National Council on the Aging.

The Washington DC area has been identified as the "Association Center of the Country." National associations with headquarters in the

Washington area employ large numbers of people and many associations having national offices elsewhere, maintain a liaison office in the nation's capital. A person seeking information can be like "a kid in a candy store," traveling from one group to another gathering information needed to identify trends and issues. Knowledge of current trends and issues helps health occupations educators make informed decisions in their area of interest and valid recommendations to their constituents. The need for an information exchange on trends and issues illuminating the State perspective led to the initiation of two communications activities: a program memorandum and a series of telephone conference calls with HOE state supervisors. There have been three memoranda and three series of conference calls since January, 1985. Positive feedback has been received on both initiatives.

The program memorandum, HOE Lines, goes to HOE state supervisors and teacher educators. They, in turn, are encouraged to duplicate the information and share it with local health occupations instructors. A sampling of the memoranda contents reveals: news of changes in state supervisors and teacher educators; news from health professional associations; editorials, e.g. "Practical Nursing;" and, information on new treatments of importance to health care educators, e.g. "Oral Rehydration Therapy."

The second initiative, regional telephone conference calls, has served as a method for gathering informations from state supervisors. The calls are structured so that the supervisors do most of the talking.

Remarks by the HOE Specialist are limited to a few opening statements and a question or two, then the rest of the time is spent listening to reports from state supervisors. Conferees receive an agenda ahead of time and the discussion is limited to one hour. During the hour participants have an opportunity to suggest agenda topics for future conferences. A summary of each previous regional call is sent to all participants before the next series of calls begins. A general summary of each series of calls is included in a subsequent program memorandum.

The third source of information is the Vocational Education Data System (VEDS). The most recent VEDS data is the 1983 enrollment data (Table 1). It is interesting to compare enrollment figures from 1966 to 1983 for vocational HOE programs. In 1966 total enrollment was 83,677 with 9,000 in secondary, 36,000 in postsecondary and 37,500 in adult programs in twelve different HOE categories. Enrollment

Table 1

Percentage of Secondary and Postsecondary Student Enrollment in Vocational Health Occupations Education, Fiscal Year, 1983*

School Year	Total Enrollment	Secondary		Postsecondary & Adult	
		Enrollment	Percent of Enrollment	Enrollment	Percent of Enrollment
1983	946,683	164,633	17.4	782,050	82.6
1982	1,008,980	213,095	21.0	795,895	79.0
1981	949,652	192,350	20.4	737,019	79.6
1980	836,117	128,672	15.4	707.445	84.6
1976	684,904	108,116	15.7	576,788	84.2
1972	336,652	59,466	17.6	277,186	82.3
1969	171,732	23,207	13.2	148,525	86.4
1966	83,677	9,793	11.7	73,884	88.3

*Vocational Education Data System (VEDS) doubled approximately every three years with 175,000 in 1969; 336,000 in 1972; 685,000 in 1976; and, 1,009,000 in 1982. The 1982 figures represent the largest recorded enrollment with 213,000 secondary and 796,000 postsecondary. The 1983 total enrollment was 947,000 with 165,000 secondary and 782,000 postsecondary in eighty-seven health occupations categories. The percentage of secondary student enrollment stayed around 15% from 1967 to 1976, then began to rise slowly until the peak, 21%, was reached in 1982. Since that time for various reasons, the percentage of secondary students enrollment has declined. VEDS data will not be available for the years 1984 to 1988; therefore, it is difficult to identify or predict trends based on available data.

A perception of current trends and issues has been formed based on information gathered from the sources described above. As Charles Dickens said, "It was the best of times--it was the worst of times!" In the "best" category can be listed:

1. The need for health care workers is predicted to increase and the percentage of health care workers prepared at the vocational and technical levels is expected to remain around 65% of total employment.
2. Technology is being incorporated into health care record keeping and instructional programs.
3. There is an emphasis on "excellence" in HOE programs.

Under the "worst" category, the items below can be listed.

1. Staff reductions in acute care hospitals have hit hardest on

workers with short term training, such as practical nurses and nursing assistants.

2. There has been a great deal of negative publicity about practical nursing programs, resulting in a decrease in the number of applicants and a lowering of applicant quality.
3. In several health occupations categories there is a push for baccalaureate and graduate degrees to be the minimum for "entry into practice."
4. There are groups who advocate postponing all "job skill" training until the postsecondary level, leaving secondary programs involved only in "orientation" and "exploration."

Two critical areas of concern for vocational and technical health care educators appear to be: practical nursing education and secondary health occupations education programs.

A search for sources of research funds has resulted in identifying four possible sources of funding: ED and three divisions in DHHS: the Divisions of Nursing and Associated and Dental Health and the National Institutes of Health.

The budget for Vocational Education within ED for Fiscal Year (FY) 1985 was $950 million. Of this amount 95%, $917 million, goes to the States to support local programs and 5%, $32 million, remains for National Programs. The principle recipient of national vocational education research funds is the National Center for Research in Vocational Education at Ohio State University. The remaining national funds are used for programs administered by the Division of Innovation and Development in the Washington DC Office of Vocational and Adult Education. There were no funds allocated for research studies coming out of the Washington office in FY 1986. Vocational Research funds were allocated for an assessment of Vocational Education to be carried out by the Office of Program Budgeting and Evaluation. This assessment will be a successor to the VEDS data system and will be based on "random sampling." Other research funds are allocated to the National Occupational Information Coordinating Council (NOICC).

The Division of Nursing, DHHS, targets their research funds principally for graduate education. However, one category, "Special Projects," with a budget of $9,500,00 is open for health occupations projects. Funds for research in nursing for FY 1987 will be funnelled to the Center for Nursing Research in the National Institutes of Health.

The Division of Associated and Dental Health, DHHS, also points the major portion of its research funds toward graduate medical and dental education. A major portion is allocated to support primary dental education, Internal Medicine and Pediatrics. Other categories for funding include: Disease Prevention/Health Promotion, Public Health, Geriatric Education and Area Health Education Centers (AHEC).

This report has described some of the information gathered by the HOE Program Specialist in the U.S. Department of Education during the past eighteen months. This information has come from three sources: (1) from outside ED—other governmental agencies and professional associations, (2) from HOE state supervisors, and (3) from the VEDS information. Trends and issues in health care and HOE were identified as well as several sources of funding for research in vocational and technical HOE.

Researchers in HOE are challenged to use the information gained at the national research conference in their specific research program. In addition, HOE researchers need to enlarge the scope of research related to the role of vocational and technical health care workers in providing health care to citizens of the United States and citizens of the world.

Reliability Considerations in Measuring Health Occupations Performance

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Reliability Considerations in Measuring Health Occupations Performance

James Noel Wilmoth

Abstract: Reliability is one of the most used, and one of the most troublesome, concepts in educational research. It is troublesome for a number of reasons, three of which are analyzed in this paper.

1. Reliability terminology and notation are not well standardized.
2. Few educational researchers fully understand the mathematical properties of reliability.
3. When not handled properly in statistical models, reliability calculations may lead to problems of multicollinearity.

Prerequisites

(1) Comprehension of measurement, scaling.

(2) Mathematical conceptualizations for sum, mean, sum of squares, variance, mean square, proportion, ratio, equation, degrees of freedom, source of variation, statistical bias, linear and statistical dependence, correlation, statistics vs parameters.

(3) Spatial conceptualizations for raw data row vector, column vector, and two-dimensional matrix.

(4) Calculation abilities for univariate statistics using both definitions based on the averaging operation and their mathematically equivalent computational algorithms.

(5) Mathematical abilities to solve linear algebraic equations in one unknown, first in the abstract, then after substitution of all known values.

(6) Tabular ability to summarize mathematical solutions for statistical problems.

(7) Practical experience with raw data matrices having "entities" in the rows and "measures" in the columns.

(8) Conceptal understandings that each "row vector" of a raw data matrix represents *observed measure values* for an entity (person, class, school, event, object, case), and that each "column vector" represents *observed entity values* for a measure (variable, occasion, instrument, item, rater, judge).

(9) Conceptual understandings of relationships between parameters and statistics as estimates of parameters.

Assumptions

(1) An observed *raw data value*, a(ij), for an entity is considered to be the sum of true, a'(ij), and corresponding error components:

$a(ij) = a'(ij) + e(i) + e(j) + e(ij)$

where e(i) is a systematic error component for the ith entity, e(j) is a systematic error component for the jth measure, and e(ij) is a random error component for the (ij)th entity-measure combination.

(2) An observed *score* or *row sum* is considered to be the sum of the elements in a row vector of observed raw data values, each raw data value containing corresponding true and error components.

(3) The error component for an observed raw data value consists of two types of error: the *systematic* error and the *random* error.

(A) Systematic errors are constants that decrement or increment by the same amount either all values in an entity row, e(i), or all values in a measure column, e(j), of a raw data matrix. It can be shown mathematically that univariate statistics calculated after *algebraic addition* of a constant to *each* "true" element of a vector, a'(ij), are precisely related to the statistics that would be calculated for the true vector of variable values (elements). Addition of a constant to every element in a vector algebraically adds the constant to the original mean and algebraically has no effect on the original variance. Thus the variance for a summarizing vector containing "true" and "systematic error" components will be the same as the variance for the "true" components alone but different from the variance for a summarizing vector containing "true," "systematic error," and "random error" components. These variances differ because the random error component is not constant across all values entering the variance calculations. It should be noted from the foregoing that mathematically it is equivalent to speak of "reliability variance," of "true variance," or of "consistency variance."

Systematic error within any observed value in a raw data matrix may be either a property of the specific entity, e(i); a property of the specific measure, e(j); or a property of both, e(i) + e(j). The sum of a "true value" and its corresponding "systematic error" components, a'(ij) + e(i) + e(j), constitutes that which is "consistent" for a raw data value. Taken together the systematic error components and the true value may be termed the "reliability" component of an observed matrix element. Moreover, systematic error components accumulate into row and column totals; that is, systematic errors are absorbed with the true values of the trait measured, hence, are confounded with true values in the means calculated for specific entities and for specific measures.

The sum of "true value" with "systematic error", that is, of consistent (or reliability), components for all elements in a vector statistically would be an index of that which is "consistent" or "reliable." The mean of consistent (or reliability) components for all elements in a vector statistically would be a corrected index of that which is "consistent" or "reliable." But that sum or mean is never specifically known. Rather, any observed sum or mean contains the consistent information in combination with inconsistent noise or random error components. In other words, any observed sum or mean contains both reliability and unreliability components. Each observed sum for an entity (a row of a raw data matrix), furthermore, is a value on a new scale different from the scale of the k individual values for the a(ij) elements of the entity vector. Similarly, the observed sum for a measure (a column of a row data matrix) is on a scale different from the scale of the n individual values for the a(ij) elements of the measure vector. The properties of the scales for entity sums and for measure sums are functions of the numbers of elements in the corresponding vectors. One should rescale or standardize the vectors of sums to the same scale as the raw data elements in order that statistics concerning them may be compared with observed values. Rescaling is accomplished by standardizing on the number of elements (*n* or *k*) in the corresponding vectors; that is, by calculating means. Thus, for test item matrices whose elements are 1's and 0's, the entity and measure means are proportions scaled to the same scale as the raw data matrix elements.

Systematic error components are constants of unknown magnitudes that have consistent presence within either an entity or a measure, or within both. Systematic error components have an unknown mean across all elements of an entity by measure raw data matrix.

Systematic errors are *not* deviations, but are contained in them: all systematic measure errors appear in the *within* entity deviations from entity means, all systematic entity errors appear in the *within* measure deviations from measure means. From mathematical derivations it can be shown that both systematic measure errors and systematic entity errors appear in deviations from the grand mean calculated for all matrix elements as one step in computing total variance.

(9) Random error occurs independent of measure and entity values, inflates any raw data matrix element as often as deflates, has a grand mean of zero, and is the "error" assumed to be reflected in sums of deviations squared for total, for within entity, and for residual that enter into reliability calculations.

In reliability calculations for all variances the presence of random error components implicitly is assumed.

Random error components both from entity to entity within a column vector and from measure to measure within a row vector are assumed to be independent.

Random error components are deviations and are assumed to have an overall mean of zero. That is, deviations from the grand mean of the raw data matrix values are assumed to be random and may be called "random errors." Also, deviations from the grand mean, both for "levels" of the entity means and of the measure means, are assumed to contain random error and may contain systematic non-error information. Each entity has an entity effect, and each measure, a measure effect. (Each deviation of a "level mean" (person or entity) from the grand mean is called an "effect.")

Any column vector _of random error components_ is uncorrelated with its corresponding vectors of both _true_ (or _reliability_) and _observed_ values.

Random error components from one vector of measures are uncorrelated with both random and systematic error components from any other vector of measures for the same entities.

The Terminology of Reliability

Computations of reliabilities may be based on the conceptual definition of a reliability coefficient as that _proportion_ of the between entity variance for a _typical_ column vector of observed values for some set of entities that is _true_ (or _reliability_) variance. Related computations are associated with (1) how the typical column vector from which the between entity variance was computed, is scaled, and (2) how to find or estimate the true (or reliability) variance of the rescaled typical column vector. The specifics used in operationalizing the foregoing definition of a reliability coefficient lead the researcher to the use of additional qualifying terms: When the column vector of raw data measures are "test" scores from the *same* test then one speaks of the "coefficient of stability" from one test or occasion to the next or of "test-retest reliability." When the measures are "test" scores from two or more *forms* of a test then one speaks of the "coefficient of equivalence" between/among the forms. When the measures are "test" scores from two or more *halves* or *parts* of a test then one speaks of the "coefficient of equivalence" between/among the halves or parts; e.g. a "split-halves reliability," or an "odd-even reliability." When the measures are "item" scores from the *k-items* of a test or subtest, or are "*rater/judge values*" for some attribute, activity, or exercise being evaluated, then one speaks of the "coefficient of inter-item consistency," or the "coefficient of inter-rater/judge reliability."

Whatever the case, the data may be laid out for analysis in essentially the same way, one format being presented in Table 1. Workable summarizing lay-outs are presented on the following pages. Those lay-outs or tables represent different approaches to the problem of calculating by hand (or with a calculator) reliability statistics for a typical teacher made test.

ANOVA Tables

Statisticians have standardized presentation formats for many statistics. In general, the statistician uses statistical tables to present data that are computationally one step back from calculated values that serve as research findings on which conclusions are based. Statistical tables usually support statistical findings. Since each reliability coefficient is computed as a ratio of an estimate of rescaled between entity reliability variance (either adjusted or unadjusted for anchor points), to some observed estimate of between entity variance (having both reliability and unreliability components). It is helpful to present tabulated estimates of variances (i.e., mean squares), computed F-ratios, and corresponding probabilities. The standardized format for presenting estimated variances is shown in the Analysis of Variance (ANOVA) Table 2. Column headings therein are so chosen that tabulated values are unbiased estimates of population parameters for sources labeled with corresponding row stubs. Thus, "Mean Square" serves as the heading for the column of values estimating variances used in reliability calculations.

Table 1

A Generalized Layout for Calculating Reliability Statistics

```
------------------------------------------------------------------------
              |      Measure       |      |       |Within|Between
   Entity     |____________________| Row  | Row   | Row  | Column
              | 1  2      . . .  k | Sum  | Mean  |  SS  |  SS
______________|____________________|______|_______|______|________
      1       |                    |A     |S      |C     |   X
      2       |                    |C     |U      |A     |   X
      3       |                    |C     |M      |L     |   X
              |                    |U     |M      |C     |   X
      .       |                    |M (BB)|A (CC) |U (DD)|   X
      .       |      [a(I])]       |U     |R      |L     |   X
      .       |        (AA)        |L     |I      |A     |   X
              |                    |A     |Z      |T     |   X
              |                    |T     |E      |E     |   X
      n       |                    |E     |       |      |   X
______________|____________________|______|_______|______|________
   Column     |                    |Grand |       |Within|Obs Bet
              |     ACCUMULATE     | Sum  |       |Entity|Measure
   Sum        |                    |      |       |  SS  |  SS
              |        (EE)        | (FF) | (GG)  | (HH) | (II)
______________|____________________|______|_______|______|________
   Column     |                    |      |Grand  |Obs   |     Res
              |                    |      |Mean   |    Between
              |     SUMMARIZE      |      |       |    Measure
   Mean       |       (JJ)         | (KK) | (LL)  |(MM)  SS   (NN)
              |                    |      |       |      |*(1/n,n)
______________|____________________|______|_______|______|________
   Observed   |                    |   Observed   |
   Within     |                    |   Between    |
   Column     |   XXXXXXXXXXXXXX   |   Entity     |
     SS       |                    |     SS       |
              |                    |    (OO)      | SS(Matrix) =
______________|____________________|______|_______|
   Rescaled   |                    |   Rescaled   | Sum(AA-LL)**2
   Within     |                    |   Between    |
   Column     |   XXXXXXXXXXXXXX   |   Entity     |     (QQ)
     SS       |                    |     SS       |
   *(1/k,k)   |                    |    (PP)      |
______________|____________________|______|_______|
```

		Tabled Symbols	Other Names
SS(Matrix)	=	(QQ)	SS(Total)
Var(Matrix)	=		Var(Total)
SS(Entity)	=	(PP)	SS(Between Entity)
Var(Entity)	=		Var(Between Entity)
SS(Measure)	=	(NN)	SS(Between Measure)
Var(Measure)	=		Var(Between Measure)
SS(NoAncError)	=	(HH)	SS(Within Entity)
Var(NoAncError)	=		Var(Within Entity)
SS(AncError)	=	(HH)-(NN)	SS(Residual)
Var(AncError)	=		Var(Residual)

r(sub)**2 = ((res bet ent var) - (Error Var)) / (res bet ent var)

Table 2

ANALYSIS OF VARIANCE

Source	SS	df	MS	F	Prob
Between Entity	(PP)	(n-1)	(BE)		
Within Entity	(HH)	(n*k-1)	(WE)		
Between Measure	(MM)	(k-1)	(BM)	(BM/RES)	( )
Residual	(HH-MM)	(n-1)* (k-1)	(RES)		
Total	(QQ)	(n*k)	(TOT)		

ANOVA tables also may be used for presenting values basic to concordance calculations, when appropriate. However, the focus for concordance calculations is the column of sums of squares, labeled "SS."

ANOVA tables also provide relevant information for computing standard errors of measurement to be discussed in detail in a later section. Suffice it here to note that the ANOVA layout reduces the ambiguity in determining which standard deviation is multiplied by the coefficient of alienation in computing a standard error.

Calculations Based on the ANOVA Table

Having an ANOVA table one can compute reliability coefficients adjusted and unadjusted for anchor points, a coefficient of concordance, and the standard error of the measurement by using the mathematical relationships presented in Table 3. A complete conceptual description for each calculation will be discussed at length in its appropriate

Table 3

Calculations Based on the ANOVA Table

Reliability Coefficient for k Measures:

$$\text{Unadjusted } r(k){*}{*}2 = \frac{\text{(Unadjusted "True" Variance)}}{\text{(Observed Total Variance)}} = \frac{(BE) - (WE)}{(BE)}$$

$$\text{Adjusted } r(k){*}{*}2 = \frac{\text{(Adjusted "True" Variance)}}{\text{(Observed Total Variance)}} = \frac{(BE) - (RES)}{(BE)}$$

Coefficient of Concordance for k Measures:

$$W = (PP) / (QQ)$$

Standard Error of the Measurement for k=_____Measures:

$$SE = \text{SqRt} \left((TOT) * \left((1-r(k)) {*}{*}2 \right) \right)$$

---

context below. Subsequent comments in those conceptualizations are indexed to Tables 1 through 3 with parenthesized characters to the left of the narrative. The reader should refer back to the tables for clarity about exactly what is being discussed in its tabular context for the overall solution.

ANOVA Concepts

(AA) "Values" for a raw data matrix are collected on
(BB) (CC)

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a scale different from the scale for row scores, totals, or means. Values for a raw data matrix also differ from summaries based on column totals or means. All such summaries should be rescaled in common before logical comparisons are made, or mathematical operations are performed, between them. That is done ordinarily by "rescaling" the results of all preliminary (or first stage) computations to the original scale of the raw data matrix.

(EE) (JJ)

(NN) (PP)

(MM) (OO)

A "deviation" of an entity mean or a measure mean from the grand mean is termed an "effect." If the analyst examines deviations of the n observed entity means of measure values, each deviation with respect to the grand mean may be termed an "entity effect." The sum of all entity effects is zero. Similarly, if the analyst examines deviations of the k observed measure means of entity values, each deviation with respect to the grand mean may be termed a "measure effect." Also, the sum of all measure effects is zero.

(LL)

"Between entity" connotes calculation across a summarizing column vector of entities.

A "between entity variance" is computed from the *n* entity effects. The between entity variance contains both the random errors and the systematic information included in each squaring operation.

(PP) A "rescaled between entity variance" across *scores*, *totals*, or *means* is considered to be the sum of the "rescaled reliability variance" for the entities measured and their "observed error variance," where the later is assumed to contain only random error.

(WE) "Within entity variance" connotes calculating,
first within raw data row vectors for every
entity to generate a column vector of
results, then across the resulting elements
(AA) of the generated column vector. From the *k*
raw data values for an entity can be
computed a within entity sum of squares or
(DD) variance for that entity. For all entities,
these sums of squares can become elements of
additional column vectors appended to the

raw data matrix. The sum of the column
(HH)
vector of sums of squared deviations within
rows with respect to their respective row
means is a collective sum of squares for
within entity "random errors" for the
(WE)
"unadjusted for anchor points," within
entity, random error variance.
(BM)

A "between measure variance" may be computed
similarly, from the k measure effects. The
between measure variance contains both the
random errors and the systematic measure
information included in each squaring
(BM/RES)
operation. When the "F value" (discussed
below) is significant, the analyst may wish
(Table 3)
to correct the within entity random error
estimate for "anchor points" (systematic, or
consistent, measure differences).
(RES)

A "residual variance" may be computed by
subtracting from the within entity computing
(HH-NN)
results (SS and df) the systematic
information associated with measure effects
in order to obtain a "better" estimate for
(Table 3)
random error, this estimate said to be
"adjusted for anchor points." This
subtraction operation applied to within
(RES)

entity results ultimately produces a "random error" variance that has been doubly adjusted: first for systematic entity effects in calculating the within entity results, then for systematic measure effects in subtracting between measures values from (RES) corresponding within entity results. "Random Error" Variance at this point in the jargon of ANOVA is the same as "Interaction" Variance.

An "F value" may be computed for the between (BM/RES) measure variance by dividing the between measure variance by the residual variance (assumed to be contained within the between measure variance). The F value may be tested for statistical significance in an F table whose numerator degrees of freedom are those of the between measure variance and whose denominator degrees of freedom are those of the residual variance.

Reliability Concepts

(Table 3) An "index of reliability" represents an approximation of the "correlation" believed to exist between a column vector of typical, values and the corresponding unobserved column vector of true values, if the vector of true values could be known. The best representation for a column vector of typical values is the respective column vector of row means calculated for the raw data matrix. The index of reliability is synonymous with the (predictive) "validity coefficient" when the predictor is "true or reliability values" and the criterion is "observed typical values" (obtained entity means). (CC)

(Table 3) (PP) A "coefficient of reliability" represents the proportion of "rescaled between entity variance" that is "rescaled reliability variance," under assumptions permitting the rescaled reliability variance to be estimated. (Table 3) Coefficient of reliability is synonymous with "coefficient of determination" when one variable is the (column vector of) "true or reliability values" and the other variable is a column vector of typical obtained values. (CC) The square root of the coefficient of reliability is called the "index of reliability."

The "coefficient of unreliability" is that proportion of "*rescaled* between entity variance" that is "*observed* error variance." Coefficient of unreliability is synonymous with "coefficient of non-determination" when one variable is the (column vector of) "true values" and the other variable is a column vector of *typical* obtained values. The square root of the coefficient of unreliability is called the "coefficient of alienation."

The coefficients of reliability and unreliability are complements of each other in that their sum is 1.00.

Explanatory Comments

If a group of students (containing "*n*" cases)
should be measured a number of times (say "*k*"
times) on some *enduring* trait, and if one
considers each temporal set (column vector) of
"*n*" measures to be comparable to each of the
other temporal sets (column vectors), then it is
reasonable to analyze the matrix of resulting
(AA) values with ordinary analysis of variance
(ANOVA) procedures. The analyst focuses first (BB) (CC)

on a *summarizing* scores, totals, or means column vector (test; form; part: half, odd or even; or item) across the "*n*" cases with a within entity

(WE)

estimate of error variance to obtain the

(Table 3)

reliability unadjusted for anchor points. The analyst focuses then on the summarizing scores, totals, or means column vector in conjunction

(RES)

with a residuals estimate of error variance to

(Table 3)

obtain the reliability adjusted for anchor points. Computationally, the residuals are

(NN)
(HH)

determined from exicising between measures results from within entity results.

(Table 3)

Error variance unadjusted for anchor points is

(WE)

the "Within Entity" random error variance uncorrected for systematic differences between/among the "*k*" measures, and having n*(k-1) degrees of freedom; whereas error variance adjusted for anchor points is the

(RES)

"Residuals" random error variance after excising systematic variance due to both sources, entity and measure, and having (n*k-1-(n-1)-(k-1)) or (n-1)*(k-1) degrees of freedom.

(BB) or (CC)

It may be helpful to consider further the summarizing column vector containing between entity data. Since the cases are not assumed to

be equivalent but, in fact, are assumed to
exhibit real differences, there is no reason to
(AA) expect element to element consistency within
columns, rather variation within columns is
(AA) expected. However, since each column is
considered to measure the same homogeneous
trait, consistency in within column variation,
between columns, would be expected: That is,
the degree of variation within columns is
expected to be stable from one column to the
next when reliability is close to 1 (high), and
unstable when reliability is close to 0.
Variation in the summarizing column vector, on
(PP) rescaling, represents variation in the "typical"
column vector of raw data.

It is possible that the variables represent
measurements for a common trait but differ
systematically from each other. After
correcting all elements for those systematic
differences (that is, after excising the effects
(BM) due to systematic variations between measures),
the resulting, adjusted column vectors should
possess roughly the same degree of variation
from column vector to column vector when
reliability is high. Thus, it is necessary, in

turn, to focus on each column vector, either in
making the systematic adjustments or, better, in
applying some statistical alternative. That is
done in one approach for computing "observed
(HH-NN)
residual" results (that is, sums of squares and
(n-1)*(k-1)
degrees of freedom) by subtracting between
measures results from within people results. An
"observed residual variance" is the ultimate
(RES)
outcome of the process.

It is sensible, also, to focus on the elements
(AA)
(WE) within the row vectors for it is in them that
within entity random variation is embedded. As
(WE)
stated earlier, this is variation "unadjusted
for anchor points (measures)." Since each row
(AA)
element is considered to measure the same entity
who is assumed not to change between measures,
(DD)
consistency within rows from column to column
would be expected when reliability is high,
unless the measures differ systematically from
each other. If the measures are of different
kinds but measure the same attribute, say
several "Part" scores for a mathematics test,
(for example, an addition part, a subtraction
part, a multiplication part, a division part,
etc., for an overall mathematics attribute)
(AA)

consistency in relative entity order would be
expected in that each part score should reflect
comparable placement of a given entity as first,
second, third, etc. with respect to the standing
of the entity in the set of "n" entities. If
(AA)
there is consistency between measures in
relative entity order within measures, and if
there are simultaneous systematic differences
between measure means as reflected in a
(NN) or (BM)
significant difference for "measure" as a source
(BM/RES)
for an ANOVA "F-test," then the unadjusted (for
(Table 3)
anchor points) within entity variance should
have removed from it components (variability and
(NN) (k-1)
degrees of freedom) representing the between
(WE)
measure differences in column means. That is,
the within entity variance should be corrected
for systematic differences between (among)
(RES)
measures in establishing the observed random
(RES)
error variance. The observed error (residual)
(Table 3)
variance that results then is said to be
(BM)
"adjusted for anchor points." However, if the
rescaled between measure variance is smaller
(WE)
than the observed within entity variance, the
(RES)
error variance adjusted for anchor points will
(WE)

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be larger than the error variance unadjusted for anchor points thereby producing an adjusted (Table 3) reliability smaller than the corresponding unadjusted reliability.

Considered as row vectors, the analyst assumes that those attributes of an entity that place (BB) or (CC) that entity at the observed score, total, or mean determined for all elements in the corresponding row vector are enduring or stable (AA) attributes within each element (measurement, score, component) contributing to the row vector. That which is enduring in the entity measured is considered, for reliability purposes, as that entity's stable component in each observed value for that entity, that which is not enduring is considered as the corresponding random "error" component at the (CC) level of the individual entity. The mean for an entity contains the true value for the entity, (JJ) systematic error, and random error. The mean for a measure contains the across entity average (AA) of true values, of systematic error values, and of random error values. To be emphasized is that means for both entities and measures contain non-systematic, or random, error; and it

is one task in reliability to estimate the
(WE) or (RES) magnitude of that non-systematic error.

A minor, but necessary, purpose for computing
"reliability" is quantitatively to estimate (or
(Table 3) summarize), in a number representative of all
entities collectively, the magnitude of real
(CC) (reliability) variability in the typical column
vector of raw data for all entities in the
measured group. Summarizing variability
(Table 2) ordinarily suggests presenting a value called
"variance," which in this case is a qualified
variance called "rescaled true (reliability)
variance." The major purpose is to report the
ratio of "rescaled true (reliability) variance"
to "rescaled between entity variance" for the
(Table 3) group. That ratio usually is called the
"coefficient of reliability."

Calculations of sum of squares for total are
(LL) undertaken under the assumption that the grand
mean for all raw data values in the matrix is
the best estimate for each matrix value, in
(AA) turn. The deviation of each matrix value from
the grand mean thus constitutes an error when
the grand mean alone is used for predicting.

(HH)

(LL) Calculations of sum of squares for within entity are undertaken under the assumption that the grand mean for all raw data values in the matrix together with systematic differences among the entity means constitute the prediction model giving the best estimate for each matrix value, in turn. The deviation of each matrix value from the grand mean plus an entity effect to arrive at the corresponding entity mean thus constitutes an error when the grand mean and entity effect are used for predicting. This error is different in magnitude from the error based on predicting from the grand mean alone except when the entity effect is zero.

(HH-NN) Calculations of sum of squares for residuals are undertaken under the assumption that the grand mean for all raw data values in the matrix together with systematic differences among the entity means and systematic differences among the measure means constitute the prediction model giving the best estimate for each matrix value, in turn. The residual for an entity by measure cell is the deviation of its matrix value from the grand mean plus an entity effect plus a measure effect to arrive at the

(CC)

(JJ)

(AA)

corresponding predicted entity by measure cell value. The residual, thus, constitutes an error when the grand mean, entity and measure effects are used for predicting. This residual error is different in magnitude from the error based on predicting from the grand mean alone except when the entity and measure effects are zero. Residual error also is different in magnitude from the error based on predicting from the grand mean with a non-zero entity effect except when the measure effect is zero.

(CC) As has been stated, the "average" of the set of
measurements for each entity reasonably may be
considered as the best estimate of the enduring
trait possessed by the entity, although the
average also contains some random error, but not
scaled to the same scale as the raw data from
(AA) which the average was computed. Each element in
the row vector for an entity may contain a
deviation, (synonymously a random error value on
the original raw data scale) from the entity
average. Thus, some summary of variability
around the entity's average may be considered
for that entity as the best estimate for the
amount of random error contributed by the

entity; that is, as the entity's contribution to
(HH) the summarizing "Within-entity sum of squares."
As noted above, a problem in scaling exists such
that the Information

(observed between entity variance) in the
(CC) summarizing column *vector* of entity means (the
vector of typical values) be somehow comparable
(AA) with the non-information, or random errors, in
the *matrix* of measures used to generate the
summarizing means. If the summarizing column
(BB) vector is a vector of totals (as equivalently it
may be without distortion of the related
mathematics) for its component row elements,
each of its vector elements contains the typical
true value for an element in its component row
vector (scaled by) *multiplied by* "*k*," as well as
a systematic error component that should be
(AA) about "*k*" times as large as in any element. If
the summarizing column vector is a vector of
means for its component row elements, each of
its vector elements contains both the typical
true value for an element in its component row
vector and a systematic error component (scaled
by) *divided by* "*k*."

While both averages and raw data random error
estimates at the level of the entity are
necessary for conceptualizing reliability,
reliability as a quantity ordinarily reflects
(CC) the "reliability values" that vary from entity
(AA) to entity, rather than varying within entity,
and that are rescaled to the same scale as the
(Table 3) input measures. The "reliability variance" must
(OO) be inferred under the assumption that an
"observed between entity variance" for a vector
(PP) of summary scores, totals, or means can be
rescaled in such a way that an observed estimate
(WE) or (RES) of (random) "error variance" can be subtracted
meaningfully from it.

(BB) or (CC) Thus, reliability is associated with either a
summarizing vector of scores, totals, or means
(one score, total, or mean for each entity).
From that summarizing vector one may compute an
average for use in computing deviations squared
(table 3) with methods based on the definition of
"variance." The average around which the
(KK) or (LL) deviations are computed may be called either the
"mean of scores/totals" or the "grand mean of
means" depending on the nature of the vector
submitted to the averaging operation.

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(Computing algorithms based on raw data values and their squares equivalently may be used for sums of squares calculations, thus eliminating the need to compute either the "mean of scores/totals" or "grand mean of means.")

(table 3)

Exactly the same reliability value is computed from both entity scores or totals and entity means because of the properties of the related mathematics. With multiplication of the observed variability both by the reciprocal of degrees of freedom and by the rescaling factor,

(PP)

either "1/k" (or "k"), one computes a rescaled variance called the "rescaled between entity variance." As described previously, one

(OO)

calculates the observed variability before rescaling from either the vector of deviations associated with the summarizing vector of mean data values around the grand mean, or the vector of deviations associated with the summarizing vector of scores/totals around their mean.

"On the whole, sources that contribute to an examinee's making the same score [value] in 'repeated' applications of a test are contributors to true [reliability] variance in the obtained [observed] scores [totals]. . . .

On the whole, things that contribute to varying
evaluations of performance of an individual in a
test are contributors to error variance."
(Guilford and Fruchter, p 414.) Determinants of
reliability variance are enduring, consistent
traits, skills or abilities, and systematic
errors that collectively contribute to
(CC) systematic individual differences within a
typical vector of test scores, ratings, or other
between-entity column vector measures. When
examinees are practically on a par with respect
(CC) to a potential source of variability then that
source does not contribute to systematic
individual differences and is neither a source
of reliability variance nor of error variance.
(CC) But to the extent that a potential source
affects different entities in different ways,
that source contributes to variance: If the
effect of the source is stable within the
(CC) entities from column vector to column vector and
simultaneously varying from entity to entity the
(Table 3) source contributes to consistent (or
reliability) variance, and, if unstable, to
(AA) random error variance. Stable from column

vector to column vector means stable from test to retest, from Form A to B, from half to half, from sum of odds to sum of evens, from item to item, from rater to rater, or from judge to judge.

The set of column vectors collectively
(AA) represents repeated or correlated measures of
the same entities so the column vectors are in
(AA) some sense comparable to each other. In
practice the column vectors may arise from:

- Giving the same test "*k*" times to produce a coefficient of stability, or, if two times, the test-retest reliability coefficient, commonly symbolized r(tt), but symbolized in this presentation as r(tt)**2.
- Giving "*k*" forms of a test to produce a coefficient of between (among) forms equivalence, or, if two forms: A and B, commonly symbolized r(AB), but symbolized in this presentation as r(AB)**2.
- Splitting a test into "*k*" parts, say into two parts: the first half and the second half, to produce a split-halves

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coefficient of equivalence, commonly symbolized r(1/2,1/2), but symbolized in this presentation as r(1/2,1/2)**2.

- Splitting a test into "k" parts, say into two parts: the odd numbered part and the even numbered part, to produce a split-halves coefficient of equivalence, commonly symbolized r(OE), but symbolized in this presentation as r(OE)**2.
- Splitting a test into "k" components and focusing on each of the "k" components: If the "k" components are the "k" items one produces an inter-item coefficient of equivalence, commonly symbolized r(k), but symbolized in this presentation as r(k)**2.
- Having data on "k" ordinal type measures: If the "k" measures are ratings, judgements, or evaluations (say for an essay test) from "k" teachers serving as "raters/judges/evaluators," one produces an inter-rater/judge reliability. Both the inter-rater reliability and the inter-judge reliability are commonly

symbolized r(k), but are symbolized in
this presentation as r(k)**2.

-Having data on "k" measures: If the "k"
measures are rankings from "k" teachers,
for example, serving as "raters," such
that there is no between measure
variability one produces a reliability
(Table 3) type statistic called "Kendall's
Coefficient of Concordance, 'W,'" as
reported in Siegel. "W," for population
data, is the ratio of observed between
entity variance to the "total variance"
for the matrix of raw data elements and
for sample data, is the ratio of between
entity sums of squares to total sums of
squares for the raw data matrix.
Kendall's coefficient of concordance is
commonly symbolized W, a practice
retained in this presentation.

(Table 3) The computational procedure for reliability
(BB) coefficients is first to score or total the
(AA) entity values across rows then to compute means
(CC) for those scores/totals. Variances for one or
the other or both (of scores/totals and of
means) of the resulting column vectors are then

determined followed by rescaling to the scale
(PP) necessary for reflecting random errors in the
individual elements in the raw data matrix of
entities by measures. Whether one calculates
with scores, totals, or means, one arrives at
the same value for "rescaled between entity
(BE) variance." Further, since that variance is
rescaled, it may be viewed as *comparable with*
random error variance based on individual raw
(AA) data values in the original raw data matrix.
Two such random error variances arise from the
(Table 2) "within entity" results and the "residuals" (the
unadjusted and adjusted for anchor points
variances respectively) and are based on all
elements in the raw data matrix of entities by
measures. Both random error variances are
assumed to be indicative of unreliability
(Table 3) (error, chance, random, or nonsystematic) at the
level of a single raw data value. Estimates of
the reliability (true, non-chance, non-random,
or systematic) *variances* in the data may then be
(Table 3) computed as the differences between the rescaled
between entity variances and the observed random
error, or unreliability variances.

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Correcting for Bias

When the researcher has sample rather than population data for reliability calculations it is necessary to consider correcting all computed values for bias. This is done by considering (Table 2) degrees of freedom as divisors of corresponding variabilities (sums of squares) thereby producing unbiased "mean squares" for estimates of population variances. Results of all (Table 2) calculations should be reported in standard analysis of variance (ANOVA) tables for publication or professional sharing.

Components of Variance in Reliability Values

Table 4 summarizes many components of variance in terms of their contributions to reliability and unreliability variances. Reliability symbols in the table should be interpreted as described in the foregoing pages. However, no distinction in the table is made between reliability coefficients (proportions) and indices (correlations) since both types have the same components.

Table 4
Components of Variance in Reliability Values

Source	Reliability				Unreliability			
	r(tt)	r(AB)	r(OE)	r(k)	r(tt)	r(AB)	r(OE)	r(k)
True variance among entity	X	X	X	X				
Error variance among entity	X	X	X	X	X	X	X	X
Systematic variance between measures within entity	X	X	X	X				
test-to-test	X							
form-to-form		X						
odd-to-even			X					
item-to-item				X				
rater-to-rater				X				
judge-to-judge				X				
Inconsistency of measurement scale between measures within entity					X	X	X	X
test-to-test					X			
form-to-form						X		
odd-to-even							X	
item-to-item								X
rater-to-rater								X
judge-to-judge								X
General skill in taking tests within entity	X	X	X	X				
Specific skill with this type test within entity	X	X	X	X				
Ability to understand instructions within entity	X	X	X	X				
Temporary conditions								
Testing environ					X	X		
Test Examiner					X	X		
Student's health					X	X		
Fatigue					X	X		
Boredom					X	X		
Emotions					X	X		
Instrumentation					X	X	X	X
Maturation					X	X		
Memory					X			
Learning					X	X		X
Time interval					X	X		
Guessing					X	X	X	X
Cheating					X	X	X	X

The Line of Regression:

If one knows the reliability coefficient, r(sub)**2 (where "sub" is any appropriate reliability subscript) one can use the square root operation to establish a value for the reliability index, r(sub). Recall that the reliability index is an estimate of the PPMCC correlation between a typical vector of observed (raw data) measures and a vector of corresponding true measures. This conceptualization as a correlation permits application of all properties of correlation to reliability determinations and interpretations. An application of correlation (not too often done) is to the line of regression for standardized data values wherein correlation is considered a goodness-of-fit property.

Of greater interest is raw data regression. One such line of raw data regression (of two possible lines) fits observed values to true (or consistent) values; that is, it represents the regression of observed on true (consistent) values scaled to the raw data matrix. The second line of regression fits true (or consistent) measures to observed measures; that is, it represents the regression of true (consistent) on observed values.

The slope of the regression line for standardized data parallel to the situation in the second fit is the same as the reliability index, a form of correlation. The exact slope of the raw data regression line, however, is indeterminable since one neither knows, nor can exactly calculate, the standard deviation of the true (consistent) values standard deviation term necessary for computing the raw data regression coefficient:

b(true.obs) = r(sub) * (std dev(true)) / (std dev(obs))

Note that (std dev(obs)) is the standard deviation of the raw data matrix of observed values. Recall that all sums of squares are rescaled to the scale of values in the raw data matrix thus it is reasonable to consider all values in that matrix as "observed" data for these related calculations.

Unless one can assume the value for the mean of the true (consistent) data vector, one cannot calculate the value of the intercept constant for the raw data regression equation. That intercept constant would be computed from

a(true.obs) = M(true) - b(true.obs) * M(obs)

Nevertheless, one can calculate the "standard error of the estimate" (i.e., in this case, the "standard error of the measurement") for the raw data regression of observed data values on true (consistent) data values. With the standard error calculated, one has a *summarizing estimate* for *all values* in the raw data matrix of the amount by which the typical observed measure deviates from its true (consistent) measure.

Before turning to an in-depth discussion of the standard error of measurement the mechanism for computing an *estimate of the standard deviation* for true (consistent) values is undertaken. Fundamentally, the mathematics are based on the equation for the concept that the *biased*, *observed* total raw data matrix variance (sigma(o)**2) equals the sum of *biased*, *unobserved* true or consistent, (sigma(t)**2), and *biased unobserved* error, (sigma(e)**2), variances:

sigma(o)**2 = sigma(t)**2 + sigma(e)**2.

Dividing each term by sigma(o)**2 gives

1 = (sigma(t)**2)/(sigma(o)**2)
+ (sigma(e)**2)/(sigma(o)**2)

The first term on the right is the reliability coefficient, r(sub)**2, the second term, the unreliability coefficient, k(sub)**2, where, as before, "sub" indicates an appropriate reliability subscript. The matrix of measures for all entities provides raw data for an *unbiased* estimate of observed error variance, thus the estimate of true (consistent) variance may be generated by manipulating the relationship:

r(sub)**2 = (sigma(t)**2)/(sigma(o)**2)

to obtain

(sigma(t)**2) = (sigma(o)**2) * r(sub)**2

The reliability index is obtainable from the reliability coefficient with the square root operation therefore an *estimate* of the raw data regression coefficient, b(obs.true), may be calculated from the relationship

est of b(obs.true) = r(k) * (std dev(obs)) / (std dev(true)).

Note that

r(sub)**2 = b(obs.true) * b(true.obs)

Also note that calculation of the estimate of (std dev(true)) is based on the same assumptions used for calculating the reliability coefficient.

Standard Error of Measurement

"Suppose we think in terms of prediction . . . from true scores [values] to obtained scores. This is impossible, practically, since we do not know the true scores from which to make predictions. Let us think rather in terms of determination: of true scores *determining* obtained scores. But [random and systematic] errors of measurement also help to determine obtained scores. We are interested in the extent of the discrepancies caused by these [random] errors of measurement, in other words, in the [*typical*] size of distortions produced in the otherwise true-determined measurements. The average of these discrepancies is estimated by the formula . . ."

sigma(obs.true) = sigma(error) * (1-r(sub)**2)**(1/2) where

sigma(error) = square root of var(matrix); that is, the margin of error when the mean of all matrix values is predicted for every matrix value,

r(sub)**2 = reliability *coefficient*, and

sigma(obs.true) = margin of error in the matrix values predicted from the mean of all matrix values and knowledge of the relationship between observed typical values and their true or consistent values; i.e., and knowledge of reliability.

The standard error of measurement is a *standard error of estimate* and may be interpreted as such: In a certain test with sigma(obs.true) equal to 2.0 units, we may say that about two-thirds of the raw data matrix values are within 2.0 units of the true (consistent) values that determined them. If a certain individual's true score were 35, for example, the odds are about 2 to 1 that the individual's raw data score in the matrix would not exceed 37 or fall below 33. Likewise, if a certain individual's consistent score were 35, the odds are about 2 to 1 that the individual's raw data score in the matrix would not exceed 37 or fall below 33. Allowing a margin of 2 standard errors of the measurement we can say that the odds are 19 to 1 that the individual's raw data score in the matrix in both cases will neither exceed 39 nor fall below 31.

No raw data score tells us what the corresponding true (consistent) score is, but with knowledge that the s(obs.true) is small, we have a degree of confidence that the true (consistent) score cannot be very far away from the raw data score. (Thinking from raw data score to true score is the reverse of thinking from true score to raw data score as presented in earlier paragraphs.) The same standard error of measurement gives us some basis for confidence as to whether the raw data scores for two entities represent a real difference or whether we can tolerate the idea that they could have come from the same true (consistent) score. (after Guilford and Fruchter, p 402.)

The standard error of measurement defines a band containing the line of regression for raw data scores on true (consistent) scores. The band establishes the upper and lower 68 per cent confidence limits for raw data scores that should be expected across the cases sampled and measured (scored) at the given time with the given test. That is, the band establishes the probable range of errors of measurement around the predicted scores as being one standard error of measurement above and one standard error of measurement below the line of regression. Given a true score, one thereby can infer the limits likely to contain the observed raw data score at any preestablished level of confidence.

The standard error of measurement may be considered as a "margin" delineating the ranges of higher and lower values within which the real line of regression for raw data scores on true (consistent) scores actually lies. In this sense, the standard error of measurement defines the "margin" or boundary within which observed values lie in much the same way that a "margin" for a page defines the boundaries within which the printed lines lie.

It should be noted that the line of regression for raw data on true scores differs from the line of regression for raw data on consistent scores in the respective values assigned to the estimates for the regression parameters; that is, in the estimates for the regression coefficients and for the intercept constants. If the systematic error contained in the consistent scores is due to "measure" alone, then only the intercepts differ. If the systematic error contained in the consistent scores is due to "entity" alone, then only the regression coefficients differ. If the systematic error contained in the consistent scores is due both to "measure" and to "entity" then both the intercepts and the regression coefficients of the consistent scores will differ from the true scores.

The foregoing discussion of standard error of the measurement reflects the contemporary literature of measurement theory. That literature emphasizes the raw data regression of observed values on true values. It may be of greater interest to examine the other regression-- the regression of true on observed values. From the latter on examines an observed score and determines at some specified probability the interval containing the true score.

Although it is not possible to calculate the intercept constant that constant is not necessary to establish the margin or bandwidth of error around the corresponding regression line of true on observed scores. It is this margin or bandwidth of error that is of primary interest. At this point, the analyst has calculated the reliability index, r(sub), and the standard deviation of the raw data for all values in the matrix, sigma(obs). The analyst also has an estimate of the standard deviation of the corresponding true values, sigma(true). All of these are related to the slope of the raw data regression line:

$$b(\text{true.obs}) = r(\text{sub}) * (\text{sigma}(\text{true}) / \text{sigma}(\text{obs}))$$

The average of the deviations from this regression line should be expressable as a standard error of the estimate:

$$\text{sigma}(\text{true.obs}) = \text{sigma}(\text{true}) * r(\text{sub})$$

The interpretation of sigma(true.obs) is parallel to the interpretation of sigma(obs.true), however, the directionality is reversed.

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Types of Continuing Education Available Compared To Types Desired by Small Hospital Laboratory Personnel

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Types of Continuing Education Available Compared To
Types Desired by Small Hospital
Laboratory Personnel

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Abstract: Data from a national study in 1982-83 are presented in this article on the types of continuing education desired compared to the types available as perceived by the respondents. The target population was laboratory personnel in hospitals with less than 100 beds. The data are divided according to geographical region and further subdivided into noncertified groups. The latter categories were established to determine if differences existed between the two types of respondents in the various geographical regions. The data indicate that differences do exist among regions and between the two groups. In addition, types of continuing education programs currently available are not necessarily the most desirable.

A national assessment of the continuing education needs of laboratory personnel employed in small hospitals was conducted in 1982-83. Small hospitals were chosen because they made up 47% of the nation's hospitals in 1980 and because there were no available descriptive data about their laboratory personnel. The investigation was designed (1) to obtain data to identify, describe, and compare the continuing education needs of certified and noncertified laboratory personnel of small hospitals in four geographic regions of the United States; (2) to define differences among all the laboratory personnel in all small hospitals in the selected states which were selected respectively to represent the four regions; and (3) to obtain a general description of the needs of laboratory personnel in small hospitals by calculating the frequencies of their responses for each selected item on the questionnaire.

Selection of the Subjects

For this study, the United States was divided into four geographic regions which correspond to those used by the U.S. Bureau of Census. Table 1 contains a listing of the states in each region. Using the _American Hospital Association Guide to the Health Care Field_, 1982 edition, the number of hospitals having less than 100 beds was determined for each state. One state requiring credentials (marked with an asterisk in Table 2) was paired with one state having no credential requirements for practicing laboratory personnel. The pairs of states were selected based upon similar total numbers of small hospitals in order to reduce the potential for regional bias and because their numbers of small hospitals were small enough to be manageable but large enough to provide a good sample. In addition, New Jersey and New Hampshire, each having 18 small hospitals, were chosen for the field test. The pairs of states selected for the study are listed in Table 2.

The field test consisted of mailing a packet of questionnaires to the chief technologist in each of the identified small hospitals in New Jersey

Table 1

States Included in the Four Geographic Regions

REGION	STATES INCLUDED
Northeast	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania
North Central	Michigan, Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, Nebraska
South	Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Texas, Tennessee, Alabama, Mississippi, Arkansas, Louisians, Oklahoma
West	Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Alaska, Oregon, California, Hawaii

Note: From U.S. Department of Health and Human Services, Inpatient Health Facilities Statistics: United States, 1978, 56.

Table 2

Selected Pairs of States for Survey of Medical Laboratory Personnel in Small Hospitals

Pairs	States	Number of Small Hospitals
Pair 1	Massachusetts	50
	Pennsylvania*	68
Pair 2	Illinois*	74
	Indiana	50
Pair 3	Alabama*	73
	Mississippi	68
Pair 4	Arizona*	46
	Colorado	59

and New Hampshire. The percentage return of the field test questionnaires is given in Table 3. The average total percentage return from the field test was 65.5%. The percentage returns from each of the two states, with the more sparsely populated rural state of New Hampshire having a return of 83%, were viewed by the investigator as a possible indication of the extent that geographical conditions may affect the study.

Development of the Instrument

This study is a corollary study to the Certificant Survey conducted by the Board of Registry in 1979. Permission was received from Dr. Melton

Table 3

Responses Received From the Field Test of the Instrument

States	Number of Small Hospitals	Number of Hospitals Returning Questionnaires	Percentage Return
New Hampshire	18	15	83.3
New Jersey	18	4*	36.4

*Materials sent to six hospitals were returned with the explanation that they had no laboratory. One hospital had closed. Two hospitals indicated preference not to participate. Percentage return was adjusted for a total of four returns out of 11 small hospitals.

E. Golmon to modify the Certificant Survey questionnaire so that noncertified laboratory personnel could be included and then to utilize the questionnaire in this study. The field trial study was conducted during September, 1982. After an examination of the items on the questionnaires returned from the field trial, the order of two questions was reversed for clarity.

Collection of the Data

Revised questionnaires with appropriate letters of introduction were grouped into packets. The number of questionnaires included in each packet was based on the number of beds of the small hospital:

Number of beds	3-9 beds	10-24 beds	25-49 beds	50-74 beds	75-99 beds
Number of question.	2	4	6	8	10

In addition, a letter of explanation was included for the laboratory supervisor, as well as a postage-paid self-addressed return envelope, and a self-addressed stamped postcard. The supervisor was asked to return the postcard upon receipt of the packet indicating the number of questionnaires actually distributed. In order to assure anonymity and to conduct an organized follow-up, a color and number coding system was devised. Every small hospital in the eight selected states (487) was sent the survey instrument during the first two weeks of October, 1982. Each technical laboratory employee (full-time and part-time) was asked to complete the questionnaire. Reminder postcards were mailed in early December, 1982 followed by letters in February, 1983.

During the third week of March, 1983, 218 follow-up packets were mailed to nonrespondents. Then on May 18, 1983, follow-up letters were sent to the administrators of the remaining nonrespondents' hospitals to determine if any of these had (1) no laboratory or (2) more than 100 beds. The percentages of returns obtained from the initial mailing and the follow-up mailing are given for each state in Table 4. Although the desired percentage of total returns was 80, this study obtained only 75.2%. This percentage represents 1,275 respondents from 325 small hospitals.

Treatment of the Data

Only data on returned questionnaires from laboratory personnel in hospitals with less than 100 beds were used for this study. The data were coded for computer input. Frequency tables were developed: (1A) data from noncertified personnel, (1B) data from certified personnel, (2) data from each geographical region, and (3) data from all respondents to selected questionnaire items. Percentages were tabulated from the data and presented in each frequency table.

Table 4

Number and Percentage of Survey Responses From Medical Laboratory Personnel in Small Hospitals by Regions From Selected States

Regions	States	No. of Hospitals	Initial return No.	Initial return %	Follow-up return No.	Follow-up return %	No lab.
Northeast	Massachusetts	50*	12	30.0	9	22.5	9
	Pennsylvania	68*	20	43.5	13	28.3	21
North-Central	Illinois	73*	37	56.1	11	16.7	6
	Indiana	50	21	46.7	13	28.9	5
South	Alabama	72	39	54.9	17	23.9	1
	Mississippi	68	36	54.5	19	28.8	2
	Arizona	46	25	56.8	12	27.3	2
	Colorado	59*	33	61.1	8	14.8	4
TOTALS		486	223	51.6**	102	23.6**	50

*1 hospital had > 100 beds

$$** \frac{\text{Number returned}}{\text{Total - (no lab. + hospitals > 100 beds)}} \text{ X } 100$$

The American Hospital Association Guide to the Health Care Field (1982 edition) was the source of information used to describe the nonrespondents' hospitals (24.8%). Hospitals of nonrespondents were compared to hospitals of respondents on the basis of location (state and region) and bed size. This comparison was performed to determine if a majority of the nonrespondents' hospitals was from a particular group (e.g., from a certain region, etc.) thereby biasing the study.

Characteristics of Sample

Data from the study indicated that 1,110 respondents worked full-time and 164 respondents worked part-time. This data was further broken down into certified and noncertified groups to determine if continuing education needs of the two groups were different. All data from respondents who indicated their professional status as certification by a certifying agency only, or state licensure and certification, were placed in the certified group. The noncertified groups consisted of data from respondents who indicated possession of a state license only, noncertification, government proficiency examination credentials only, and other (e.g., x-ray certification) (Baker, p. 180).

As Table 5 shows, 1,110 respondents worked full-time while 164 worked part-time. Of the full-time employees, 77.1% were certified and 22.9% were noncertified. The part-time group contained 80.5% certified personnel and 19.5% noncertified. These data indicate that certified and noncertified personnel were similarly represented in both the full-time and part-time personnel groups.

Table 5

Number of Respondents Employed Full-Time or Part-Time Classified As Certified or Noncredited Laboratory Personnel

Employment	Certified		Noncertified		Total
	No.	%	No.	%	
Full-Time	856	77.1	254	22.9	1,110
Part-Time	132	80.5	32	19.5	164
Totals	988		286		1,274*
% of 1,274 Total		77.6		22.4	

*1 case missing

Respondents were asked to identify the level of continuing education (C.E.) that would be most helpful to them. The levels were basic, intermediate, and advanced as defined by the P.A.C.E. Program of the American Society for Medical Technology (A.S.M.T.).

> BASIC--an introductory presentation for those who have had little or no previous education experience or training in the subject.
>
> INTERMEDIATE--requires basic knowledge and training in the general subject with some knowledge of the science applicable to the subject. It also includes "refresher" programs.
>
> ADVANCED--(specialty)--technical discussion and/or practice in techniques, principles, and applications, and refinements in a subject area. Intended for those who are current in their skills and knowledge of routine standard practices in the subject area.

Almost 98% of the certified group chose intermediate or advanced levels, but only slightly more than 83% of the noncertified group chose those levels. Of the remaining percentage of each group, over five times more of the noncertified group chose the basic level than did the certified group (Baker, p. 178). Clearly, there are differences in perceived continuing education need levels of the two groups.

When asked to identify the greatest perceived restriction to formal continuing education, the location of the respondents became evidently important. Tabulated responses according to region are shown in Table 6. Respondents in the West region clearly indicate a geographical restriction. Program availability and financial restrictions took a much lower second place. In the South, program availability was of greatest concern with scheduling restrictions close behind. The Northeast and North Central regions both indicate program availability as the greatest restriction followed by financial restrictions (Baker, p. 178).

Table 6

Greatest Restriction to Formal Continuing Education According to Region

	West		South		Northeast		North Central	
Perceived Restrictions	No.	% of 232 resp.	No.	% of 356 resp.	No.	% of 396 resp.	No.	% of 291 resp.
None	24	8.3	23	5.9	13	5.7	18	5.1
Program Avail.	58	20.0	110	28.2	79	34.5	103	29.2
Financial	58	20.0	64	16.4	51	22.3	78	22.1
Scheduling	48	16.6	102	26.2	39	17.0	65	18.4
Geographical	81	27.9	33	8.5	19	8.3	36	10.2
Employer/ Family	21	7.2	58	14.9	28	12.2	53	15.0

From the comments given by several of the West region respondents, geographical restrictions and program availability may well be one and the same problem in that the distance through mountains and desert is too great for the programs currently available. Usually two days must be devoted to traveling in addition to the workshop, etc. This travel time obstacle creates problems in both funding and work release time.

In reviewing the data from the South, the conjecture could be made that many small hospitals are functioning at a minimum staffing level creating scheduling problems. Since program availability was the greatest problem, the assumption could be made that scheduling problems would be reduced if programs were better designed to meet the needs of small hospital laboratory personnel.

Types of C.E. Available

Several general categories of continuing education were developed. The commonly purchased programs were classified as: (1) audio-visual programs, (2) case history reviews, and (3) challenge or self-assessment examinations. Technical programs conducted by commercial suppliers made a fourth group with employer/institution inservice as a fifth group. All continuing education programs offered as a function of professional organizations or societies comprised group six. The three remaining groups represent traditional modes of continuing education at the 2-year college, 4-year college or university, and correspondence courses taken through either.

A composite of the responses concerning available programs is given in Table 7. Audio-visual programs were available to almost half of the respondents in all regions except the West. Less than one-third of the

Table 7

Types of Continuing Education Available

Types*	West		South		Northeast		North Central	
	% Cert.	% Noncert.	% Cert.	% Noncert.	% Cert.	% Noncert.	% Cert.	% Noncert.
Audio-visual prog.	44.0	32.2	41.6	43.6	49.2	48.9	52.4	47.1
Case History	29.7	13.6	19.6	15.5	24.3	14.9	26.6	12.9
Challenge or Self-Assessment	32.3	22.0	25.2	18.2	17.8	17.0	24.1	14.3
Commercial Suppliers	52.2	25.4	48.3	44.5	56.2	51.1	51.0	44.3
Employer/Institution Inservice	45.7	35.6	29.0	20.9	49.2	31.9	49.3	54.3
Prof. Organizations or Societies	59.1	25.4	55.2	39.1	59.5	48.9	59.1	35.7
2-Year College	29.3	32.3	25.9	35.5	25.4	27.7	31.8	30.0
4-Year College	26.3	20.3	35.7	36.4	38.4	40.4	33.6	35.7
Correspondence Courses	38.4	30.5	21.0	12.7	15.1	29.8	21.0	12.9
None/Don't Know	4.3	6.8	4.9	9.1	4.9	8.5	4.9	7.1
Total Respondents	232	59	286	110	185	47	286	70

*Respondents were asked to mark all C.E. programs that were available to them.

noncertified respondents in the West indicated that audio-visual programs were accessible.

Respondents from all regions indicated only limited availability of case history based self-assessment exercises. Except in the Southern region, all others show a 10-13% perceived availability gap between certified and noncertified personnel. The noncertified group indicated the least availability of case history exercises in all regions.

Challenge or self-assessment examinations were almost equally available to both certified and noncertified respondents in the Northeast. However, the percentage was very low. All other regions show a 7-10% decrease in the perceived availability of this type of continuing education by the noncertified group as compared to the certified group.

With the exception of the noncertified group in the West, commercial suppliers provided continuing education programs for approximately half of the responding personnel. The western noncertified group indicated only slightly more than 25% availability of these programs, possibly due to distance once again. Employers provided one-third to one-half of the respondents continuing education programs as inservice except in the South where the percentages were lower. Percentages of continuing education provided by professional organizations and societies were similar to that provided by commercial suppliers or distributors. Once again, the noncertified group indicated a lower availability.

Two-year colleges provided more continuing education to the noncertified group in every region except the North Central where the difference in the two groups was only slight. Four-year colleges had programs available to a somewhat greater percentage of the respondents except in the West where two-year college programs were more accessible to the noncertified. Correspondence courses were most often perceived as available to the certified group except in the Northeast where almost twice as many noncertified personnel indicated availability of this type continuing education than did the certified personnel.

In addition, those respondents indicating they did not know what types of continuing education were available or that none was available ranged from about 4 to 9%. In each region, the noncertified group represented the highest percentages in this range.

Types of C.E. Desired

A composite of the responses indicating desired types of continuing education is given in Table 8. Audio-visual programs were most desired by the certified respondents in all regions with an approximate average of 43%. Case history based self-assessment exercises were desired by almost 62% of the noncertified group in the Northeast. This figure is about 14% above any other group in any other region. This same group also had the highest percentage of respondents to indicate a desire for challenge or self-assessment examinations.

Desire for continuing education programs from commercial suppliers or distributors ranged from a high of 40.5% in the Northeast certified group to a low of 21.8% in the South noncertified group. Continuing education provided by the employer or insitution was desired by a greater percentage of the respondents in the noncertified groups of the Northeast and North Central regions. Continuing education activities through professional organizations or societies was desired by approximately half of all respondents except the noncertified groups in the South and North Central regions.

Table 8

Types of Continuing Education Desired

Types*	West		South		Northeast		North Central	
	% Cert.	% Noncert.	% Cert.	% Noncert.	% Cert.	% Noncert.	% Cert.	% Noncert.
Audio-visual prog.	43.5	42.4	44.4	33.6	42.7	40.4	41.3	35.7
Case History	48.3	30.5	39.2	28.2	40.5	61.7	42.3	32.9
Challenge or Self-Assessment	34.9	20.3	28.0	26.4	32.4	40.4	33.2	32.9
Commercial Suppliers	37.9	25.4	37.4	21.8	40.5	38.3	37.1	28.6
Employer/Institution Inservice	29.7	22.0	33.9	30.9	36.8	42.6	32.2	37.1
Prof. Organizations or Societies	50.9	52.5	52.4	27.3	49.7	48.9	55.6	34.3
2-Year College	12.1	11.9	9.4	18.2	11.4	12.8	12.9	11.4
4-Year College	34.5	35.6	27.3	24.5	35.1	21.3	36.0	40.0
Correspondence Courses	32.8	33.9	35.3	37.3	26.5	46.8	31.8	41.4
Not Interested	0.0	1.7	0.7	0.9	1.6	0.0	1.7	2.9
Total Respondents	232	59	286	110	185	47	286	70

*Respondents were asked to mark a maximum of five types of C.E. in which they would be most interested in participating.

Two-year college continuing education programs were desired by less than one-fifth of all respondents. On the other hand, four-year college programs were desired by an average of one-third of all respondents with the North Central noncertified group having the highest percentage (40.0). In all regions, correspondence courses were desired most often by noncertified respondents.

A "not interested" category was provided for those respondents having no desire for continuing education. The highest percentages in every region except the Northeast were in the noncertified groups.

Comparisons of Total Percentages

Collapsing all data to form Tables 9 and 10, several types of continuing education have obviously large differences in percentages for availability compared to desired types of continuing education. The first (Table 9) is case history reviews. Almost twice as many case history exercises are desired as are perceived as being available. This is true of both certified and noncertified personnel. Challenge or self-assessment examination percentages indicate the same trend but to a lesser extent. Correspondence courses were desired twice as much as the perceived availability of the same by noncertified personnel.

On the other hand, commercial suppliers or distributors, professional organizations or societies and employer or institution types of continuing education are generally perceived as being available more than desired by both groups. Two-year college continuing education programs are available almost two and a half times more than desired. In contrast, four-year colleges have approximately the same percentage of programs available as are desired. About 10% more respondents indicated a desire for correspondence courses than indicated availability of the same.

Table 9

Total Data Comparison for Certified and Noncertified Respondents

Types	Available			Desired		
	% Cert.	% Noncert.	Total %	% Cert.	% Noncert.	Total %
Audio-visual prog.	46.7	43.0	45.9	43.0	37.1	41.6
Case History	24.9	14.3	22.5	42.5	35.3	40.9
Challenge or Self-Assessment	25.2	17.8	23.5	32.0	29.0	31.3
Commercial Suppliers	51.5	41.6	49.3	38.0	26.9	35.5
Employer/Institution Inservice	42.6	37.8	41.5	33.0	32.5	32.9
Prof. Organizations or Societies	58.0	37.1	53.3	52.5	37.8	49.2
2-Year College	28.3	32.2	29.2	11.4	14.3	12.1
4-Year College	33.4	33.6	33.4	33.0	30.1	32.3
Correspondence Courses	24.0	19.2	22.9	32.1	39.2	33.6

Total Respondents = 1275

# Certified = 989

# Noncertified = 286

Table 10

Total Regional Data Comparison

Types	West % Avail.	 % Desired	South % Avail.	 % Desired	Northeast % Avail.	 % Desired	North Central % Avail.	 % Desired
Audio-visual prog.	41.6	43.3	42.2	41.4	49.1	42.2	51.4	40.2
Case History	26.5	44.7	18.4	36.1	22.4	44.8	23.9	40.4
Challenge or Self-Assessment	30.2	32.0	23.2	27.5	17.7	34.1	22.2	33.1
Commercial Suppliers	46.7	35.4	47.2	33.1	55.2	40.1	49.7	35.4
Employer/Institution Inservice	43.6	28.2	29.5	33.1	45.7	37.9	50.3	33.1
Prof. Organizations or Societies	52.2	51.2	50.8	45.5	57.3	49.6	54.5	51.4
2-Year College	29.9	12.0	28.5	11.9	25.9	11.6	31.5	12.6
4-Year College	25.1	34.7	35.9	26.5	38.8	32.3	34.0	36.8
Correspondence Courses	36.8	33.0	18.7	35.9	18.1	30.6	19.4	33.7

Total Respondents = 1275

Table 10 contains regional data comparisons. One major regional difference is shown under correspondence courses. The West region is the only one in which correspondence courses are available slightly more than desired. In the other three regions, the availability of this type of continuing education is about half of what laboratory personnel desire. In addition, respondents from the South indicated that employer/institution inservice was not available as much as they would prefer. Even more notable, though, is the comparison of inservice availability in the South to the other regions. Apparently, the South offers only one-half to two-thirds the amount of employer/institution inservice continuing education as do the other regions.

Respondents across the nation desired more case history reviews and challenge/self-assessment examinations. Respondents in the Northeast desired twice as many self-assessment examinations as they perceived available.

Conclusions

Major differences in continuing education needs do exist between certified and noncertified personnel as well as among regions. Nationally, respondents indicated a desire for more case history and self-assessment types of exercises. The major portion of continuing education for small hospital laboratory personnel should be at the basic to intermediate levels.

Each region showed at least one major variation from the other regions. The West respondents indicated a much lower availability of four-year college C.E. programs and correspondence courses. Respondents from the South indicated fewer employer or institution C.E. programs available. In the Northeast, noncertified respondents spoke out strongly for more case history exercises, self-assessment examinations, and correspondence courses. The North Central region, on the other hand, had the highest percentage of respondents not interested in continuing education at all.

To look at these data another way, any of the types of continuing education listed will not be viewed desirably by one-half to two-thirds of the target population in small hospitals. But also, of all the C.E. programs currently on the market, only half of this segment of the population is aware of their existence.

Reference

Baker, S.A. (1984). Rural hospitals' lab workers feel they need more training. _Modern Healthcare_, _14_, 178-180.

Modularized Competency-Based Geriatric Nursing Assistant Curriculum

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Modularized Competency-Based Geriatric Nursing Assistant Curriculum

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ABSTRACT: A study was conducted to determine the essential components of a modularized competency-based geriatric nursing assistant curriculum. Having determined the competencies needed by the nursing assistant for successful performance in care of the elderly, the curriculum was developed. A survey instrument was designed and distributed to nursing directors for distribution to nursing assistants in 64 nursing homes in Idaho. The survey gathered the following information from prospective students: educational level; perceived need, interest and future enrollment in a training program; ranking and selection of content. Out of 1,500 surveys distributed, 924 or 61.1% of the total mailed were returned from 63 out of 64 facilities. The curriculum development was based upon guidance from an advisory committee of geriatric specialists, results of the survey, and review of literature. The curriculum is recommended as advanced training after completion of basic nursing assistant training.

The United States is a youth-oriented, competitive and productive nation. Americans place a great value on the vigor and freshness of youth and hold the energetic, medal winning athlete in high esteem. At the other end of the life continuum are the old and the sick who in America become synonymous with the non-productive, the isolated and persons on the verge of death (Butler, 1975). The elderly who become incapacitated with decreasing developmental and functional abilities, who are unable to perform self care, may find themselves in a nursing home surrounded by unconcerned, and many times, untrained personnel. The literature abounds with incidences of residents being totally dehumanized (Bowker, 1982; Kayser-Jones, 1981; Moss & Halamandaris, 1977). Not so extreme are the stories of routinized custodial care with little attention being paid to restoration, rehabilitation and quality of life.

The most frequent caregiver in a nursing home is the nursing assistant who provides 90% of that care (Butler, 1975). Some nursing assistants receive formal training, many do not. The assistants who do not receive training usually learn on the job from other assistants who may or may not have been trained. The only formalized training program which is recognized throughout Idaho is the Nursing Assistant Curriculum Guide printed in 1978 by the Idaho State Board of Vocational Education. The major emphasis in this guide is on the basic skills of physical care, such as bathing, feeding and dressing. The basic skills are essential and necessary for good care. However, they are basic and serve as a prerequisite to the advanced competencies needed to meet the total needs of the elderly. Geriatric care is a specialty and requires that all health care team members be skilled in that specialty. There is an anticipated demand for more well trained caregivers because of the projected increase in the aging population. As the over 65 years age group increases, those needing nursing home care will increase proportionately (AMA/ANA Task Force, 1983). The training now provided in the state of Idaho has inadequately addressed the special needs and problems of the elderly.

Purpose of the Study

The purpose of this study was to determine the essential components of a geriatric nursing assistant curriculum. Two objectives were also identified: (a) to determine the competencies a geriatric nursing assistant needs to perform successfully on the job, and (b) to develop a competency-based curriculum in geriatric care for nursing assistants based on those competencies.

The review of literature which follows has indicated that increased geriatric nursing assistant training is a concern throughout the nation. The review has focused on the importance of the nursing assistant's role, the changing philosophy of geriatric care, the problems which interfere with the rendering of care in nursing homes, the competencies needed by nursing assistants in geriatric settings, and the value of using the competency-based approach in the development of a geriatric nursing assistant curriculum.

Role of the Nursing Assistant

The nursing assistant is the non-professional member of the nursing team and is part of the multidisciplinary health care team. The nursing assistant works under the supervision of the registered nurse (R.N.), the licensed practical nurse (L.P.N.), or the physician (M.D.). The nursing assistant assists the R.N. and the L.P.N. in providing care. In many states, the assistants are required to take a prescribed course and pass a state test in order to receive a certificate and keep their jobs (McClelland & Kaspar, 1984). In Idaho, certification is not required. It is possible to be hired and given limited training on the job.

Philosophy

Butler (1975) concluded it is the nursing assistant who provides most of the care which primarily is response to the physical needs (ignoring other needs). Unfortunately, this is true in many nursing homes today inspite of the changing philosophy of care. When nursing homes were established in 1935 as a result of the Social Security Act, the philosophy of care was custodial (Kahana, 1971). New knowledge of the restorative powers of aging individuals has contributed to a current philosophy of rehabilitation and restoration. Giving impetus to the newer philosophy was the Medicare and Medicaid Acts of 1965 (Kane, Solomon, Beck, Keeler & Kane, 1981; Kahana, 1971). Kane et al. also realized that establishing a geriatric curriculum which reflected the current philosophy and suitable for all levels of health care workers was a critical and challenging task.

Problems in Nursing Homes: Interference with Care

The lack of a humanizing climate in nursing home environments has been the subject of several investigators. A major investigation was conducted by senators Moss & Halamandaris (1977) for 14 years. Other investigators reported on the atrocities of dehumanized care: Bowker (1982) and Kayser-Jones (1981). These authors freely described the abuses and insults rendered by untrained personnel, especially the nursing assistant. Abuses included mental and physical harm, verbal threats of killing and the disrobing of men and women in front of each other at sinks for bathing. Kayser-Jones (1981) classified the incidences she saw into four categories: (a) infantilization, (b) depersonalization, (c) victimization, and (d) dehumanization. Bowker compared his observations of nursing home environments with those of prisons which he found to be similar. The similarity was in the lack of attention to the humanizing dimensions which he borrowed from Howard (cited in Bowker, 1982). The dimensions that personnel need to adopt in order to humanize a nursing home climate and environment are briefly summarized: respect for the whole person, empathy, granting of rights, allowing residents to make choices, treating residents as equals and as persons of value, able to decide about their own care.

Loebel & Eisendorfer (cited in Williams, 1981), in discussing environmental factors necessary for rehabilitation of the elderly, were emphatic about the emotional climate within the rehabilitative setting. The emotional climate must reflect a " 'therapeutic environment'" (p. 51) in which the caregiver maintains an expectancy of the resident's improvement. The emotional tone of staff is crucial. The emotional tone must be that of "respect, enjoyment, and a belief in their (the residents') recovery" (p. 50). Bowker (1982) and Kayser-Jones (1981) did not experience the desireable environment in homes they visited.

The communication patterns and interpersonal relationships between staff and residents in nursing homes have been noted as an ongoing problem that is antagonistic and counter-productive to restoration and rehabilitation. The pattern of labelling individuals by diagnosis rather than by their names, limiting care to the physical needs while ignoring the emotional and social needs, and using humor to ridicule the resident's behavior (Haynes, 1980) are prime examples. The nursing assistant who uses these kinds of communication patterns may be adding to the problem by reflecting the behaviors of the supervising staff. On the other hand, the depersonalizing and dehumanizing behaviors of the nursing assistant have been partly blamed on the background she or he may have. According to Moss & Halamandaris (1977) and Bowker (1982), the majority of nursing assistants have not completed high school and may have criminal records. Bowker also found that many had no real interest in caring for the elderly; it was a job that provided an income no matter how meager. Low pay and hard work have been given as reasons for the high turnover rate of nursing assistants, a rate between 75-100% (Moss & Halamandaris, 1977; Rango, 1982). The turnover rate has been used as a reason by nursing home administrators for not training nursing assistants - why train when they leave so soon?

Nicholson & Nicholson (1985) offered a solution to the problems of high turnover rate and resident dissatisfaction. Writing about the Personalized Care Model (PCM) they said, "The implementation of the PCM insures total accountability of the staff, increases staff morale, modifies staff attitudes ... and reduces staff turnover and absenteeism" (p. 7). Nicholson and Nicholson (1985) claim the Personalized Care Model is a way to provide training that ensures improved care and at the same time reduces turnover. The staff feels good about what they accomplish with the residents; they have a reward that is personal. The PCM is a model of nursing home care which has been under research in Jewish nursing homes in New York.

The nursing home industry is not without other problems. According to Gapen (1985), poor care attributed to untrained caregivers has given incentive to the filing of law suits against the major corporations which have been buying chains of nursing homes. The corporations have been accused of reducing staff below levels safe enough to care for the frail residents. Allegations made against the corporations have also alluded to the reduction of supplies and services to residents in order to realize great profits. (Gapen, 1985).

Looking at the positive side of the industry, Dunlop (1979) wrote about the improvements made in nursing homes. This was supported by Warner (1978) who published a report of Idaho residents. Ninety-three percent said their care was good. Tjosvold & Tjosvold (1983) worked in homes where they witnessed a humane and nuturing environment and staff who continued to search for ways to improve services.

In the meantime, many problems occur for the resident who must resort to the nursing home setting as a place to live. The nursing home resident has been typically described by Moss & Halamandaris (1977) as: female, poor or near poor, old, widowed, on several drugs, has difficulty ambulating, stays 2-4 years, is physically and mentally impaired, comes from home and will probably never leave the nursing home. This picture of the nursing home resident is changing somewhat because of the newer repayment system of the federal government to hospitals. Patients are leaving hospitals earlier, sicker, and in many cases, entering nursing homes requiring more care than in the past (Gapen, 1985). The relocation of the elderly person from one facility to another has contributed to more problems which require continual monitoring and problem solving.

The relocation of the elderly person has caused a crisis situation resulting in confusion, withdrawal, depression, increased dependency and in some cases rapid deterioration. (Moss & Halamandaris, 1977; Bowker, 1982). Sperbeck & Whitbourne (1981) reported on the learned helplessness that results from the dependency, a syndrome which develops partly as an expectation of the caregiving staff. All of these reactions call for nursing interventions or a crisis situation may result.

Competencies Needed By The Nursing Assistant

Bowker clearly indicated the "fully human needs" (p.1) are not being met in nursing homes. Gensberg (cited in Ebersole & Hess, 1981) wrote that the philosophy of caregivers in long term care facilities must be based on the view that the nursing home "is not the end for the aged person, that life continues with meaning and value and the nurse (or nursing assistant) is an important person in the aged person's life"... (p. 605). Such a view complements the changing philosophy of care from custodial to rehabilitative. It follows that the nursing assistant, a key member of the care team in the nursing home, must be trained for the competencies which are generated from that philosophy.

Blank (1982), the primary reference for the competency-based curriculum, stated that tasks and competencies are being used as synonomous terms; both terms indicate the outcomes expected from student performance. For the purposes of this study, the tasks of the geriatric nursing assistant are the competencies which incorporate the knowledges, attitudes, and psychomotor skills for successful performance. Successful performance as a geriatric nursing assistant will mean performing the tasks that meet the needs of the elderly.

The major components (areas of competency) that have been identified as essential in a curriculum for nursing assistants in geriatric care are the following:

1. Theoretical foundations of geriatric nursing care.
2. Human needs: The aging person and the caregiver.
3. The aging process: Changes and nursing responses.
4. The geriatric health care team: The nursing assistant as important team member.
5. Care planning: The key role of the nursing assistant.
6. Health promotion, restoration and rehabilitation of the elderly.
7. Emergencies and accident prevention.
8. Legal and ethical responsibilities and issues.
9. Therapeutic communication.
10. Common diseases of the elderly and nursing responses.
11. Activities in resocialization.
12. Drug use and abuse: Observation, intervention and reporting.
13. Interpersonal relationships: Residents, family, staff
14. Grief, dying and death.

The writings of McClelland & Kaspar, 1984; Will & Eighmy, 1983 & Ebersole & Hess, 1981, contributed to the identification of the above listing.

The Value of the Competency-Based Curriculum

Prior to the development of the curriculum, searches were made through the Educational Resources Information Center (ERIC), Psychological Abstracts, amd Medline without finding any curricula pertinent to geriatric nursing assistants. Textbooks recently published on nursing assisting devote a section to care of the elderly but do not reflect the competency-based approach utilized in this study.

The review of literature has provided support for the development of a geriatric nursing assistant curriculum. The selection of a competency-based (CB) approach will serve two purposes: (a) the curriculum will be in keeping with the Idaho State Department of Vocational Education to have all programs competency-based (Idaho State Division of Vocational Education, 1982, p. 9), and (b) the characteristics of the competency-based approach allows the learner to become skilled without the pressure of time usually imposed in traditional instruction. Blank (1982) expressed two philosophical points in this regard: (a) "'Human competence' is the ability to perform, and (b) most anyone can perform well if given enough time and quality instruction" (p. vi). A synopsis of Blank's characteristics of CB curriculum is given here:

1. What the student learns is based on the job; competencies are known by student in advance of instruction.
2. Learning activities are student-centered and designed to help the student master the tasks (competencies). Time is provided for repetition of the task; continual teacher feedback is given to student.
3. There is a pre-set performance standard; when the student performs the task with high proficiency in a job-like setting credit is given. Student then progresses to the next task (p. 5).

These characteristics of the competency-based approach satisfy the needs of the adult learner as described by Knowles (1978). The prospective geriatric nursing assistant will come from the present nursing assistant population which is made up of adults. The self-paced learning style also provides a non-threatening feature which is appropriate for students with limited educational background. Malcolm Knowles (1978), a leading authority on adult learning, has given reassurance that the characteristics of the adult learner complement those of the competency-based curriculum.

METHODS AND PROCEDURES

The methods and procedures used in this study have been organized under the following headings:

1. Formation of a Curriculum Advisory Committee.
2. Communication with Specialists in the Field of Geriatrics.
3. Development, Distribution, and Analysis of the Survey Instrument.
4. Implementataion of Procedures in Development of the Geriatric Nursing Assistant Curriculum.
5. Field Testing and Revision of the CB Modularized Curriculum.

Formation of a Curriculum Advisory Committee

An advisory committee was formed of eight professionals who have been working in the field of geriatrics and a ninth member representing Health Occupations, Idaho State Department of Vocational Education. The geriatric professionals included a geriatrician, two geriatric nurse practitioners, three directors of nursing of nursing homes, an administrator of a nursing home and a staff nurse. Representing the state agency was the supervisor of health occupations. Informally, other nursing directors and nursing assistants participated as the development of the curriculum progressed.

The role of the advisory committee involved activities which guided the development of the survey instrument, delineated nursing assistant tasks, advised on components of the curriculum, provided nursing homes for pilot testing of the modules, and generally were available for consultation and resource materials.

Communication with Specialists in the Field

Written and telephone communication was established with the National Council on Aging in Washington, D.C.; the Ebenezer Center For Aging and Human Development in Minneaplois, MN; the Andrus Gerontology Center at the University of Southern California; Veterans Administration Medical Center Nursing Home Unit at Roseburg, Oregon; and the Jewish Home and Hospital in the Bronx, New York. All of these agencies were contacted in order to obtain advice and resource materials.

A visit was made to the Juan de Fuca Hospitals (nursing Homes) in Victoria, British Columbia, Canada. The purpose of the visit was to observe the facilities and to learn about the progressive restorative nursing techniques. A planned program of visitation and consultation was provided for the investigator, including attendance at meetings which provided insight into the comprehensive geriatric services. In addition, individuals with noted experience in instruction and authorship in the field of geriatrics were contacted.

Development, Distribution, and Analysis of the Survey Instrument

With input from the advisory committee, local nursing home directors of nursing, and nursing assistants, a questionnaire was composed by the investigator for distribution to nursing assistants in the state of Idaho. The questionnaire was designed with three objectives in mind.

The three objectives used for the composition of the instrument were: (a) to obtain a profile of prospective students, (b) to determine the level of interest and need for an advanced training program in geriatric care, (c) to determine the important areas of content as perceived by the respondents. It was further decided to keep the questionnaire simple and succinct. This decision was based on the factual information to be gathered and the expected educational level of the group being surveyed. The instrument was piloted tested by 11 nursing assistants in a local nursing home. Respondents participated in a verbal analysis following completion of the survey. Revisions were made based on their suggestions.

The cover letter accompanying the questionnaire was written to the directors of nursing in nursing homes. Prior to mailing, two directors of local nursing homes reviewed the letter and made suggestions for revision. Following revision, the administrator of the Idaho Health Care Association, the association which represents the directors of nursing and administrators of nursing homes, and the president of that association endorsed the letter. Guidelines from Wiersma (1985) and Orlick, Clark, Fagan, and Rust (1975) were used in composing the letter.

At the suggestion of nursing directors from two nursing homes, a staffing pattern was utilized to arrive at an approximate number of nursing assistants employed in the nursing homes in Idaho. Using the census from each nursing home, and the usual staffing pattern of nursing assistants, (one assistant for each eight residents on day shift, one-half of the day shift staff plus the same number of part-time nursing assistants for evenings, and one-half of the evening shift full-time staff for night shift), an estimate of 2,768 employed nursing assistants was made. It was decided to limit the mailing of the questionnaires to 1,500. Each questionnare was pre-coded for each nursing home. The director of nursing in each facility received a cover letter, questionnaires for at least 50% of the estimated number of nursing assistants employed, and a stamped envelope for the return of each questionnaire. Two weeks following the mailing, a follow-up by telephone was made to the director of nursing in nursing homes with no respondents. Nursing directors were asked to have the questionnaires returned as soon as possible.

The procedures used for the analysis of the questionnaire were frequencies and percentages. These totals provided the information needed on the number of responses for each question: sex, age, educational level, completion of basic training, number of continuing education sessions, interest in geriatric training, prospective enrollment in geriatric training, and the respondents percieved need for particular content. The provision of topics in the survey was a suggested revision made by the nursing assistants who pilot tested the questionnaire.

Implementation of Procedures In Development of the Geriatric Nursing Assistant Curriculum

The primary reference utilized in the curriculum development was the Handbook For Developing Competency-Based Training Programs (Blank, 1982). Of the 12 tasks outlined by Blank, 10 of them were used as guidelines in the curriculum design. The Performance-Based Teacher Education Modules, published in Athens, Georgia (1978-79), were also guides in preparing student-centered learning activities. The ten tasks utilized are as follows: (a) identification of a job description, (b) identification of prerequisites, (c) identification and verification of job tasks, (d) analysis of job tasks and addition of knowledge, and affective competencies, (e) written terminal performance objectives, (f) sequencing of tasks and terminal performance objectives, (g) development of performance tests, (h) development of written tests, (i) development of learning modules, (j) and field testing of modules. The procedures used which provided major direction for the development of the curriculum were: the advisory committee, the specialists, results of the survey, review of literature and the tasks as outlined by Blank.

Field Testing and Revision of The CB Modularized Curriculum

The modules are being tested at two levels. The first level is the continual review by advisory committee members and other professionals. The second level is the on-site testing of the modules at training sites. The modules are currently in the process of being reviewed, revised, and field tested.

Results and Discussion of the Survey

From the total of 1,500 surveys mailed, 924 (61.1%) were returned. Respondents represented 63 out of 64 facilities (98%) in major cities and towns throughout Idaho. Information gathered produced a profile of the respondents: female (92.5%), between 31 and 49 years of age (40.2%), a high school graduate or above (69.2%), completed a basic certificated nursing assistant program (65%), worked 3 years or more in geriatric care (61%).

Responding to the question on whether they saw a need for an advanced geriatric nursing assistant training program, 769 (84%) agreed one was needed. When asked if they would enroll if the training was offered, 661 (72%) said yes, 71 or (8%) said no, and 180 or (20%) were undecided. Those giving a no or undecided response indicated cost, followed by family responsibilities, were the major reasons.

Respondents were asked to rank five separate topics of curriculum content as to importance in caring for the elderly. The topic with a rank of #1 was highest in importance; the topic with a #5 was lowest in importance. The topic and rank are as follows: (a) #1--Communications; (b) #2--Changes in the elderly; (c) #3--Stress and the elderly; (d) #4--Physical fitness and exercise; and (e) #5--Humor as part of caring. Following the ranking of these topics, respondents were asked to choose additional topics from a list of 12. Reponses are in Table 1. The results show the number one concern of nursing assistants is mental disorders, such as Alzheimer's disease, which causes the resident to have difficulty in remembering and in controlling one's behavior. Of significance is the low selection of interpersonal relationships, one of the key factors in establishing the desirable emotional climate for rehabilitation of the elderly, and in providing the humanizing environment. (See Table 1).

Table 1

Number of Respondents and Percentage of Total for Topics Listed

Topic	Number of Respondents	Percent of Total
Alzheimer's and related diseases	607	66
Common diseases of the elderly	505	55
Drugs and the elderly	468	51
Rehabilitative therapies	444	49
Personal stress on the job	440	48
Restorative nursing	420	46
Remotivation of residents	397	43
Care planning	340	37
Hospice programs	287	31
Interpersonal relations	227	25
Personal study techniques	197	22
Other	57	06

Conclusions and Recommendations

Conclusions:

1. The basic nursing curriculum, known as the certificated nursing assistant curriculum, does not prepare nursing assistants for the special and complex needs of the elderly.

2. Nursing assistants caring for the elderly, nursing directors of nursing homes, advisory committee members and other specialists, have clearly indicated a geriatric nursing assistant curriculum is needed and wanted.

3. The tasks necessary for nursing assistants to meet the needs of the elderly lend themselves to a competency-based curriculum.

Recommendations:

1. The geriatric nursing assistant curriculum be established as advanced training for nursing assistants who remain in nursing homes or in settings where they care for the elderly.

2. The basic nursing curriculum be a prerequisite to the geriatric nursing assistant training program.

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Changes in Health Care: Effect on Curriculum Revision

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Changes in Health Care: Effect on Curriculum Revision

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Abstract: This paper reports interim results of a pilot study which examined the essential behaviors of respiratory therapists and how and where those behaviors could be learned best in view of medical practice pattern changes and health insurance restrictions. Using the critical incident technique, respiratory therapy students were asked three main questions: (a) What was the situation? (b) What did you do? and (c) What was the result? In addition, subjects were asked to specify in what setting or combination of settings that experience could be learned - simulation, laboratory, and clinical. The data provide a basis for curriculum revision to insure that graduates would be effective respiratory therapy practitioners.

Americans now spend over $1 billion a day on health care, making it the largest industry in the United States last year. The leading issue in health care is how costs can be contained without eliminating vital services. Many measures have been adopted to curb spending: construction of new hospital facilities and nursing homes has decreased, the purchase of expensive equipment, such as CT scanners, has been restricted, second opinions are being required by insurance companies before surgery or hospitalization can be effected, and patients are being asked to share the cost of medical bills. One of the most revolutionary changes now underway is the new method of prospective payment that was introduced by Medicare in 1983. According to the diagnostic-related groups (DRG'S) legislation, a hospital is paid a fixed sum in advance for the treatment of a Medicare patient with a specific diagnosis. Since the hospital must bear the loss if the cost of treatment exceeds the fixed payment, many hospitals are discharging patients sooner and are using out-patient facilities more extensively to conduct routine tests. While the new system applies only to Medicare patients, many State Medicaid programs and private insurance carriers are using the DRG guidelines. Many hospitals predict a marked decrease in hospital occupancy due to DRG'S and the shift in services to more out-patient settings.

The concern in Health Occupations Education programs is how these changes in medical practice patterns and health insurance restrictions will effect the quantity and quality of clinical experiences for our students. Hospitals and long term facilities are an important component of clinical experiences for our students. With these limited resources, several questions are raised:

1. What can we do for health occupations education students to fulfill the clinical component of their respective programs?

2. What clinical experiences would be vital and therefore have to be accomplished within the acute care setting?

3. What experiences could be accomplished with simulations or the laboratory setting, thus freeing up hospitals for those clinical experiences that cannot be obtained in other ways?

4. How can we determine which experiences would be vital to graduates of health occupations education programs?

These questions were the basis for a pilot study of one respiratory therapy program.

Conceptual Framework

In order to determine first what are the experiences of the student in the clinical area, and second, where can those experiences be mastered, it was determined that the critical incident technique can be utilized effectively as a job analysis procedure. The critical incident technique evolved through the efforts of John C. Flanagan and his associates while working in the aviation psychology program of the United States Army Air Force during World War II. However, the roots of the methodology extend back even further:

> The roots of the present procedure can be traced directly back to the studies of Sir Francis Galten nearly seventy years ago and to later developments such as time sampling studies of recreational activities, controlled observational tests, and anecdotal records. The critical incident technique as such, however, can best be regarded an outgrowth of studies in the aviation psychology program of the United States Army Air Force in World War II. (Flanagan, 1954, pp 327-328)

Although the critical incident technique had its origin in the aviation psychology program, it was not until after the Second World War that the technique was developed formally and given its present name.

After the war, Flanagan and a few associates established the American Institute for Research in Pittsburgh. It was through the work of the Institute as well as the work of advanced graduate students at the University of Pittsburgh, that the technique was adapted to a variety of new situations.

In order to answer the questions raised in the introduction, it was determined that the Critical Incident Technique could be used for collecting incidents having special significance and meeting systemically defined criteria. Essentially, there are five steps included in the critical incident technique:

1. Determine the general aim of the activity.
2. Develop plans and specifications for collecting factual incidents.
3, Collect data.
4. Analyze data.
5. Interpret and report the data.

These five steps were used in a pilot study of one health occupation, Respiratory Therapy. By determining what experiences are vital to program graduates and where those experiences could be mastered, the effects of medical practice patterns and health insurance restrictions will not affect adversely the performance of respiratory therapy graduates. Information from the study will help to revise the current respiratory therapy curriculum.

Methodology

Subjects for the pilot study included respiratory therapy students from an eastern Iowa community college who volunteered to participate in the identification of critical incidents. The general aim was to determine the essential behaviors of respiratory therapists and how and where those behaviors could be learned best in view of the increased acuity of patient care and the expected decrease in patient census at Iowa hospitals. Subjects were asked three questions: What was the situation, What did you do, and What was the result. In addition, students were asked to categorize the experience as to where it should be learned. Specifically, they were asked

1. Could this behavior be mastered in only one setting? If yes, which setting: laboratory (school or hospital), simulation (defined as the application of knowledge and skills to a specific client based on a clinical judgment of the client's needs), or clinical facility.

2. Is it necessary to master this behavior in a combination of settings? If yes, which combination: simulation and laboratory, simulation and clinical, laboratory and clinical, all settings.

Critical incidents were collected from respiratory therapy students over a two month period. The incidents were sorted into six categories:

Ventilator Management - incidents related to ventilator care including parameter changes, ventilator set-ups, circuit changes, and trouble shooting.

Oxygen Therapy - incidents related to oxygen delivery such as set-ups, analyzing oxygen, and trouble shooting.

Communication Skills - incidents related to oral and written communication and teaching.

Treatment Modalities - incidents related to aerosol treatments, delivering medications, chest physiotherapy, weaning parameters, and blood gases.

Equipment Maintenance - incidents related to the maintenance of equipment.

Other - incidents not related to the above categories. Sorting of the incidents was completed by a research assistant, a practicing respiratory therapist.

The incidents were entered on a computer using the PC-FILE III. The PC-File III is a general purpose data base manager program. After the incidents were entered on the computer, copies of the incidents were printed without specifying the practice setting. A group of practicing respiratory therapists sorted the bahaviors according to where those behaviors could be mastered. This served to validate where the behaviors can be learned best.

Results and Discussion

Table 1 shows the number of critical incidents in relation to category and setting. Of the 145 recorded incidents, 40 incidents could be learned best in the laboratory setting. No incidents could be mastered from the communication skills category in the laboratory setting and only one behavior from the oxygen therapy category. Table 2 lists the incidents found within the laboratory setting.

Twenty-one incidents required the clinical setting with no incidents listed under equipment maintenance category. Those incidents that could be mastered in the clinical area are found in Table 3.

Table 1

Numbers of Critical Incidents in Relation to Category and Setting

Category	Setting					
	Laboratory	Clinical	Laboratory/Clinical	Simulation/Clinical	All Settings	Total by Category
1. Ventilator Management	11	4	16	2	7	40
2. Oxygen Therapy	1	5	4	1	0	11
3. Communication Skills	0	2	3	4	0	9
4. Treatment Modalities	8	5	25	3	5	46
5. Equipment Maintenance	9	0	0	0	0	9
6. Other	11	5	10	0	4	30
Total by Setting	40	21	58	10	16	145

Table 2

Incidents Within the Laboratory Setting

Ventilator Management

- Did vent check, saw line clamped off to humidifier, unclamped line so it could function properly.
- Learned what a scavenger line was used for and how it was set up.
- Worked with Servo ventilator--learned how to use the flow sheet, change the circuit and use the different ventilator parameters.
- Analyzed FIO2's and measured cuff pressure.
- Did vent checks and parameter changes.
- Set up transport ventilator.
- Checked out the Bennett 7200 ventilator.
- Checked out the MA2 ventilator.
- Did vent checks on Servo C ventilator.
- Corrected an inappropriately set volume alarm on a Bear 1.

Oxygen Therapy

- Set up an ultrasonic nebulizer for patient.

Treatment Modalities:

- Practiced arterial puncture.
- Did chest PT on a pediatric patient (x2).
- Drew blood gases from arterial line.
- Interpreted arterial blood gases.
- Gave an ultrasonic nebulizer treatment.
- Did chest PT by hand.
- Did mosquito blood gas.

Table 2 (continued)

Equipment Maintenance

Assembled and bagged equipment when an O ring was found. This was meant to be in the coil water trap to prevent a massive air leak. Replaced O ring, informed staff.

Checked out function of two Servo C's. Helpful in getting to know the operation of the machine better.

Changed oxygen electrode membrane successfully. Electrode calibrated correctly.

Took electrode out of blood gas machine, changed the membrane, cleaned the electrode, reinserted and calibrated the machine--rountine maintenance (x2).

Maintained blood gas machine, prepared new electrodes, put membrane on them and machine was recalibrated (x3).

Assembled all parts for an Ambu bag for the crash cart.

Other

Needed to read barometric pressure from barometer. Adjusted bottom of gauge and read pressure with some assistance. Could be done in any setting but needs to be stressed more in the curriculum.

Traced pictures of the placement of the swan ganz catheter through the heart.

Learned how to compute AVDO2.

Used Ambu bag with PEEP valve to bag patient.

Learned how to set up and calibrate capnometer.

Learned how to perform flow volume loops (x2).

Learned how to do diffusion test.

Learned how to bag bagy.

Table 2 (continued)

Worked with PFT machine SRL 100 IV.
Practiced CPR chest compressions.

Table 3

Incidents Within the Clinical Setting

Ventilator Management

Weaned patient alternating assist control and CPAP modes (x2).

Changed patient to CPAP. Observed volumes and pressure.

Did CPAP trials.

Oxygen Therapy

Discovered there were only seven tanks left and more needed to be ordered.

Charted on oxygen rounds, flagged patients, and made new order cards.

Inappropriate oxygen concentration per order, consulted charge nurse and chart, corrected order.

Found oxygen setup in room but no doctor's order, checked chart, talked to charge nurse, pulled oxygen equipment.

Oxygen supply cut off in hospital area, hooked up patients to tanks, oxygen supply returned, patients returned to wall hook ups.

Drew gas on patient, results poor, order from doctor to change oxygen level.

Noticed oxygen tubing disconnected. Hooked it up, still some oxygen level, oxygen concentration changed.

Communication Skills

Talked to physician about decreasing oxygen concentration on a patient, change made.

Flagged charts and verified physician orders.

Table 3 (continued)

Treatment Modalities.

Patient's high heart rate alarm went off, patient irate and blue, usual reaction when suctioning required, suctioned, patient calm, lungs clear.

First femoral stick, ruled out other sites, checked pulses and obtained gas.

Gave aerosol treatment, listened to breath sounds, took pulse, respiratory rate, assessed changes, treatment caused loose, productive cough.

Gave an aerosol treatment, heart rate decreased from 62 to 48, patient hypoxic with irregular heart beat, stopped treatment and notified physician.

Infant turning blue during CPT, paused in treatment, checked heart rate, increased oxygen, color pink, treatment resumed.

Other

Exposure to new area, NICU which I had never worked before.

Bagged a patient during transport to CT.

Observed code blue in X-ray.

Watched extubation and reintubation of a patient.

Participated in a code, bagged patient.

Fifty-eight incidents could be learned best in a combination of laboratory/clinical settings with no incidents listed under equipment maintenance category. Table 4 lists the incidents found within the laboratory/clinical settings.

Ten incidents could be mastered in a combination of simulation/clinical settings with no incidents listed in the equipment maintenance or other categories. Those incidents that could be mastered in a combination of simulation/clinical settings are found in Table 5.

Sixteen incidents were listed for mastery in all settings with no incidents listed in the oxgyen therapy and communication Changes in Health Care categories. Table 6 lists the incidents found within all settings. No incidents were chosen for mastery in the simulation only.

The data revealed that 68 percent of the incidents in ventilator management and 72 percent of the treatment modalities could be mastered in the laboratory and laboratory/clinical settings. Eighty two percent of the incidents in oxygen therapy could be mastered in the laboratory/clinical and clinical settings. All incidents in equipment maintenance could be mastered in the laboratory setting whereas all communication skills would require the combination of simulation, laboratory, and clinical settings.

Information from this study was shared with the community college faculty. Faculty were surprised at the range and depth of the critical incidents. The incidents listed in the tables are close in number and

Table 4

Incidents Within the Laboratory and Clinical Settings

Ventilator Management

Initial setup and parameter changes on the Servo C Ventilator, figured F factors, tidal volume, minute volumes. Patient gases were good.

Patient extubated, ventilator no longer needed, disconnected vent, wiped it down, set up new circuit, checked out vent for the next patient.

Ventilator circuit due for change, assembled circuit, changed circuit, checked bilateral breath sounds and expiratory volumes. Everything functioned.

Vent low expired volume alarm went off, checked connection and alarm setting, wiped off transducer, returned volumes improved. Alarm stopped.

Ventilator went inoperative, nurse bagged while I troubleshot the machine. No problems found, vent replaced, and taken to equipment person.

Circuit changed on patient on roto-bed, rigged two circuits together to allow slack in tubes when bed turns, changed circuits, volumes returned.

Patient had poor blood gas, doctor ordered increase in respiratory rate, rate changed on ventilator and blood gas improved.

Machine malfunctioned, not sensitive to patient effort, tried trouble shooting machine then changed ventilators, problem corrected.

Table 4 (continued)

Leak in system, not returning volumes on vent, checked circuit cuff pressure, volumes with wright's, patient sealed on own and volume returned.

Vent check done, checked settings and cuff pressure, check completed and ventilation completed.

Low pressure alarm sounded on ventilator, checked connections, tubing disconnected from patient, reconnected and effective ventilation restored.

Did vent check, respiratory monitor read 110, observed pressure monometer and determined vent was self-cycling. Adjusted sensitivity, problem corrected.

Took full responsibility for care of a vent patient, including checks, postural draining and charting.

Used CPAP in weaning a patient from the ventilator.

Changed vent circuit on a Bear 1.

Helped set up a ventilator to change with another vent being used by patient, set dial to appropriate settings, then bagged patient while vent was changed.

Oxygen Therapy

Oxygen equipment needed changing but doctor's order had expired, gathered supplies and replaced setup as doctor rewrote order.

Patient's oxygen was hissing, traced cannula from patient to humidifier, found oxygen line clamped in patient's chair, line loosened, hissing stopped.

Did trouble shooting on a ventilator to find a leak in the ciruit. Checked various parameters, problem corrected.

Table 4 (continued)

Changed a heated aerosol circuit on a patient with a tracheotomy.

Set up oxygen hood and watched extubation of a neonate.

Communication Skills

Weaning patient from ventilator, coached in proper breathing technique.

Reassured patient during a frightening experience.

Coached patients on various pulmonary function tests.

Treatment Modalities

Drew a blood gas from a pediatric patient using a blood saver system, felt more comfortable using the system after the procedure.

Order for blood gas, explained procedure, performed Allen's test, palpated site, alcoholed site, drew sample, held site. Ran sample, oxygen marginal, suggested patient carry oxygen with him.

Arterial blood gas ordered to check oxygen level with patient on room air, selected site, prepared and stuck patient, redirected, got sample, took sample to lab, results good.

Gave aerosol treatment, listened to breath sounds, took pulse and respiratory rate, assessed changes. Treatment caused loose, productive cough.

Patient due for aerosol treatment, gave treatment, better aeration, less wheezing and congested cough.

Doctor ordered aerosol treatment, weaning parameters followed by ABG. Did treatment, good gas results, no further action.

FVC and NIF ordered on patient, did each three times and charted best results. Values near patient's norms.

Table 4 (continued)

Aerosol treatment ordered, rechecked order, gave treatment, monitored patient, breath sounds increased (x2).

Pre and post brocho-dilator treatment ordered. Entered needed data, instructed patient to perform spirometry test, stored information on disc, good review.

ABG to be done on patient, gathered supplies, explained procedure, palpated artery, did Allen's test and obtained sample, took to lab and recorded results.

Blood gas ordered, gathered materials, verified order, explained procedure to patient, performed Allen's test, did puncture and obtained sample. Sample taken to laboratory and results charted (x5).

Inaccurate blood gas results, bubble found in electrode, reran sample and obtained accurate results.

Observed a finger stick blood gas that kept clotting before blood could be drawn. Attempted another site and sample obtained.

Went to ER to give a hand held nebulizer treatment, learned where to get the paperwork and equipment I needed to do such a treatment.

Did chest PT on a patient, after chest PT suctioned the patient via nasal tracheal route.

Postoperative patient breathing very shallow. Encouraged deep breathing and coughing, did inventive spirometry.

Conducted weaning parameters on a patient.

Suctioned patient using sterile technique (x2).

Did hand held nebulizer treatment paying close attention to breath sounds.

Table 4 (continued)

Other

Patient leaking around cuff, pilot balloon not sealing, connected blunt needle and stopcock. Cuff sealed at lower pressure and tidal volume returned.

Pulmonary function test, put patient data into computer, instructed patient, did not follow directions. Test repeated. Difficult to tell if patient uncooperative or unable to do test.

Baby extubated himself. Bagged the patient while patient was intubated without difficulty.

Observed an ear oximeter study. Looked at the oxygen saturation at rest and then again on oxygen with exercise and then again at rest.

Watched pulmonary function test being performed.

Observed resuscitation on infant.

Applied isolation techniques in caring for a patient.

Observed pneumogram for patient apnea.

Changed tracheotomy tube on my patient.

Ausculated breath sounds.

Table 5

Incidents Within the Simulation and Clinical Settings

Ventilator Management

After poor blood gas, patient intubated and placed on vent. Low pressure alarm went off, patient bagged, machine checked out, patient demand too much for machine, changed modes, problem corrected.

Observed negative pressure ventilator on a patient.

Oxygen Therapy

Extubated patient, had difficulty oxygenating, changed oxygen therapy.

Communication Skills

Blood gas oxygen resulted in low 70's. Patient, 71, with smoking history. Doctor wanted to increase oxygen level but reminded him of patient's age and smoking history and suggested leaving oxygen at that level. Doctor agreed.

Patient needed repeated sticks for blood gases to check oxygen level after changes. Arteries bruised, difficult to obtain sample, talked to doctor who decided to monitor with ear oximeter.

Miscommunication between student and nurse. I confronted the nurse and we worked out a solution.

Giving an aerosol treatment, heart rate decreased from 62 to 48. Patient hypoxic with irregular heart beat, stopped treatment and notified physician.

Treatment Modalities

Bagged patient for suctioning, blood started spurting from

Table 5 (continued)

E.T.tube, suggested putting patient back on vent. Doctor notified.

Infant turned blue during CPT. Paused in treatment, checked heart rate, increased oxygen, patient pinked up and treatment resumed with no further difficulty.

Gave an aerosol treatment, heart rate decreased from 62 to 48, patient hypoxic with irregular heart beat, treatment stopped and doctor notified.

Table 6

Incidents Within All Settings

Ventilator Management

Admitted patient to NICU, took physician's orders, set proper settings, didn't panic.

Ventilator set at 1200cc tidal volume, returning 1200-1400cc.

Dried transducer, checked cuff and volume with Wright's and found machine was giving extra volume, notified appropriate person.

Patient complained of shortness of breath, observed ventilator pressure, OK, increased sensitivity and flow rate, helped patient to feel more comfortable.

Did vent check, respiratory monitor read 110, observed pressure monitor and determined vent was self-cycling, adjusted sensitivity, problem corrected.

Doctor ordered PEEP study, charted baseline parameters, drew baseline ABG, decreased PEEP, checked parameters and ABG, patient did well on lower PEEP.

Setup vent for postop patient, set reasonable parameters, asked doctor for orders, put patient on vent, ausculated chest, equal breath sounds, good return volume.

Patient back from surgery, adjusted parameters to doctor's order, attached patient, ausculated chest, equal breath sounds good, volumes returned.

Treatment Modalities

Baby's heart rate decreased during chest PT, stopped treatment and bagged patient, condition stabilized.

Table 6 (continued)

Did chest PT on baby, baby stopped breathing, stimulated baby to breathe, notified staff, baby recovered.

Did chest PT on infant when heart rate dropped, stopped PT and bagged patient, heart rate returned to normal levels.

Baby had bradycardia during CPT treatment, bagged baby until heart rate increased, patient stabilized.

Did CPT on baby, heart rate decreased, bagged patient, heart rate returned on previous reading before CPT.

Other

Patient coded on the general floor area, patient was stabilized and then transferred to ICU.

Called to a code, bagged patient with mask then helped with intubation, continued to bag patient while ventilator was set up, gained confidence in a code situation.

Code in Emergency Room, observed staff person bagging patient, followed heart monitor, patient revived.

Code blue response, difficulty with intubation, area not equipped with suction and oxygen, I bagged and suctioned, tube taped and patient transported to ICU, placed on ventilator.

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category to the planned distribution of clinical experiences which serves as a validation of the sample. Three areas for curriculum revision were suggested by the faculty:

1. The low number of communication skill incidents demonstrates the need to provide more opportunities in this category.

2. The critical incidents listed under laboratory and laboratory/clinical will be used as a guide for developing additional laboratory exercises.

3. Additional curriculum revision will be centered on the need for formal seminar time built into each clinical day. Opportunities to discuss these critical incidents closer to the time of occurence should increase the knowledge and understanding of all students.

Conclusions and Implications

The data provide important information for decision making in curriculum revision based on changes in medical practice patterns and health insurance restrictions. All categories except Communication Skills have incidents that can be mastered in the laboratory setting. More effective use of the laboratory can provide additional time in the clinical setting for those experiences which are vital to ensure that graduates are safe, effective practitioners.

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POST-SECONDARY
HEALTH OCCUPATIONS STUDENTS' PREFERENCES
FOR
ACCESSING, PROCESSING AND JUDGING
INFORMATION

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Post-Secondary Health Occupations Students' Preferences for Accessing, Processing, and Judging Information

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Abstract: Applying knowledge of student learning styles has been one response to pressures for educational accountability. The purpose of this study was to compare the information and decision-making preferences of HOE students in different health occupational programs and different educational settings. Using a stratified cluster sample of 1,187 students enrolled in 15 health occupational fields and three educational settings, data were gathered using a modified Form G of the Myers-Briggs Type Indicator. Data were analyzed using multiple techniques. The findings indicated significant differences existed in the sensing/intuition preferences of HOE students in different occupational programs and students with different preferences enroll in different educational settings.

According to the Bureau of Labor Statistics (ASAHP, 1984), ". . . employment in most of the health occupations is expected to grow faster than the average as population growth--especially the growth in the number of older people--increases the demand for health care" (p. 3). Demands will be placed on programs to produce competent practitioners for the 240,800 annual job openings anticipated (Health Occupations Education division, 1983). However, the constraint of available financial resources, and the recognition that the costs of the educational programs to prepare health practitioners are substantially above those of other types of programs, will require that educators and administrators be as cost-effective and educationally efficient as possible (Blagg, 1985; Miller, Beckham, & Pathak, 1983).

Increasing pressures, both internal and external, are forcing administrators and educators to critically evaluate their programs in order to be accountable, that is, effective and efficient, for the resources they have and utilize (Ginsberg, 1985; Jaeger. 1983, King & Breegle, 1983; Reinhardt, 1984; Vittetoe & Hooker, 1983; Walt, 1985). The thrust for accountability is especially true within the Health Occupations/Allied Health area which has been engaged in the extensive effort to meet current and future manpower needs of the health care delivery system (Milliken, 1982; Vittetoe & Hooker, 1983; Wesbury, 1983). Miller, Beckham and Pathak (1983) expressed this concern as follows:

> The number of dollars allocated, programs initiated, and students enrolled for allied health professions education within the university setting has steadily increased over the past 30 years. Because of the perceived need for allied health professions, society in the past has been willing to provide support, without question, for their training. The health education scene in the last few years, however, has been influenced by spiraling inflation and its corollaries, including a push toward cost containment and progressive reduction in funding. Simultaneously, the public's realization of the lack of quality control and accountability in the health care fields has led to the need for

> internal and external examination and review of health education institutions' missions, goals, role, and performance. (p. 3)

Efforts to address the thrusts for accountability, that is, effectiveness, efficiency, and excellence in educational endeavors, have led to a number of approaches. One such approach has been the application of knowledge concerning student learning preferences and/or styles. While the awareness of student differences in learning is not new to the educational arena, the increased interest in applying the concept is new (Andrews, 1980; Claxton, 1982; Keefe, 1978; Knaak, 1983; Kogan, 1979; Milliken, 1982).

The capabilities for the determination of HOE student preferences are available. The application of that knowledge for curricular design, instructional processes, and counseling and advisement could be done. However, relatively little research has been done identifying the preferences of students enrolled in the various educational programs for the health occupations (Vittetoe & Hooker, 1983). The research of Myers (1962) and McCaulley (1972) focused upon health practitioners and revealed that significant differences exist between the specialists and generalists within the medical field and some of the associated areas of Allied Health. Few studies have focused on students and their preferences between the various health occupation education/allied health programs (Payton, Heuter, McDonald, & Hirt, 1980; Ragle & Ross, 1982; Rezler & French, 1975). The author of this research could find no references to indicate if student preferences differ between the various educational settings.

The Purpose and Objectives of This Study

The purpose of this study was to identify the factors associated with information and decision-making preferences of students enrolled in different health occupations education (HOE) programs and settings. This information, though useful and important, was not known.

There were five objectives to the study. The first was related to the differences in preferences of students enrolled in their chosen HOE programs. The second was to determine the differences in preferences between students who enroll in health occupational programs within the various educational settings of the hospitals, junior or community colleges, and vocational/technical institutions, and the 4-year colleges or universities.

The third objective of the study was to identify the association between selected biographical items (age, sex, race, academic achievement in secondary education, highest educational level completed, and education of each parent) and student preferences for the basic mental processes (Sensing/Intuition and Thinking/Feeling) and attitudes (Extraversion/ Introversion and Judging/Perception). The fourth objective was to identify the effects of selected biographical items and preferences upon student choice of educational program within the health occupations field. The final objective was to identify the effects of the selected biographical items, preferences, and choice of health occupations educational program upon the choice of educational setting, when alternatives were possible.

Definitions Used for the Study

For the purposes of the research, the following terms were defined--student, preferences, health occupations education programs, and educational setting. Student was defined as an individual enrolled in the first year of professional studies leading to one of the health occupational titles. Students enrolled in pre-professional coursework and students enrolled in coursework beyond the first year of the professional curriculum were not included. Preferences reflect the construct of Carl Jung's theoretical framework which defines four basic mental processes (Sensing, Intuition, Thinking, and Feeling) and the attitudes of Extraversion/Introversion and Judging/Perception (Jung, 1923). Health Occupations education programs are defined generically, according to Milliken (1982), as ". . . all educational programs which prepare personnel for practice within the health industry" (p 1). Likewise, Allied Health programs generically are defined by Milliken (1982) as ". . . health-related professions which do not fall within the domains of medicine, nursing, or dentistry . . ." (p. 1). Similarly, the American Society of Allied Health Professionals (1984) has recently re-defined "allied health personnel" to more adequately reflect the growing field of allied health/health occupations.

Currently,

> . . . The term 'allied health professional' means an individual trained at the associate, baccalaureate, masters, or doctoral degree level in a health care related science, with responsibility for the delivery of health care or health care related services (including services related to the identification, evaluation, and prevention of diseases and disorders, dietary and nutrition services, health promotion, rehabilitation, and health systems management), but who are not graduates of schools of medicine, optometry, podiatry, or nursing. (p. 1)

For the purposes of this study, health occupations referred to the following 15 selected health occupations as having met the criteria of the definitions attributed to Milliken and ASAHP--Dental Assisting, Dental Hygiene, Medical Assisting, Medical Laboratory, Medical Laboratory

Technician, Medical Records, Medical Technology, Occupational Therapy, Physical Therapy Assisting, Physical Therapy, Radiography, Radiography Technician, Radiological Technician, Respiratory Therapy, Respiratory Therapy Technician, and Surgical Technician. The educational setting was defined as one of the three major institutional settings within which the majority of health occupation education programs are located. As is characteristic of the national profile where 95.8% of all HOE programs are located in three types of major institutions, the selected educational programs were located within (a) hospitals, (b) junior colleges, community colleges, and vocational-technical institutions, and (c) senior colleges, universities and medical or dental schools (DAHEA, 1985).

Conceptual/Theoretical Framework of the Research

Peter Drucker (1981), an observer of the educational practices in American higher education, has predicted that basic changes in teaching will occur in the near future. These changes will come about not so much as a result of the responsiveness of the institutions, which are notoriously resistant to change, but as the result of increasing pressures exerted by the persons being served (Drucker, 1981). Claxton, Adams, and Williams (1982) assert that as the general public realizes that research now documents the efficacy of mastery learning and individual learning styles, increasing pressures will be exerted on the institutions to incorporate these two concepts and to design curricula, learning experiences and the organizational structures and procedures which reflect their use.

The concept of student learning styles, as well as teaching styles, has been a focus of research and writing in recent years (Dunn & Dunn, 1978; Kolb, 1984; Lawrence, 1984, Messick et al., 1976; Meyers, 1962, 1980; Witkin, et al., 1977). However, Patricia Cross in Accent on Learning (1976) laments, ". . . not one teacher or counselor in a hundred knows anything at all about cognitive styles despite the fact that research on cognitive styles has been going on for some twenty-five years" (p. 112).

Both of the terms "cognitive style" and "learning style" refer to how people desire or prefer to move towards a goal or destination, that is, the preference a person uses to gain information or skills, and/or makes decisions or judgments. The term "learning style" though similar to "cognitive style" in most regards has a more specific context. For example, as defined by Claxton and Ralston (1978), "learning style" is ". . . the student's consistent way of responding and using stimuli in the context of learning" (p. 1). It has been defined as ". . . a personally preferred way of dealing with information and experience for learning that crosses content areas" (p. 22) by Della-Dora and Blanchard (1979). The term "learning style" appears to have emerged as the more common term in recent literature and would appear to consider cognitive style to be in the same category as learning style.

An early contributor to the concepts of cognitive style and learning style was Carl Jung. Although he did not conduct research specifically focused on cognitive style nor is he cited in literature pertaining to it, his work did provide a prototype or model of style division. He identified the function of perception (sensing and intuition), function of judgment (thinking and feeling), and attitude preferences (extraversion and introversion). This scheme has been incorporated into some of the more recent works of Gregoric (1977), Hagberg and Leider (1978), Kolb (1984), McCarthy (1981), McKenney and Keen (1974), and Myers (1962, 1980). All share much in common and the Jungian theory underlies them all.

Researchers and counselors, addressing occupational choice or career studies, have found that all types of people are not equally interested in all occupations (Smith, 1980; Stroops, 1972). Undergraduate students have been found to be attracted to varied careers and various Jungian types were drawn to particular fields of study.

According to researchers, certain predictions can be made regarding student enrollment in educational programs and specifically within health occupational programs (McCaulley, 1978; Middleton, 1980; Ragle & Ross, 1983; Rezler & French, 1974; Rovezzi-Carrol, 1982; Vittetoe & Hooker, 1983). McCaulley (1976) and Boyles, Morgan and McCaulley (1981) have reported that Introverts tend to be found in greater numbers as educational levels increase. However, little research has focused upon the differences of students' preferences between educational settings.

Inferences have been reported concerning effects of preferences in work situations (Myers, 1980) and educational situations such as the predictable differences in learning styles and student response to teaching methods (Myers, 1980). However, Weidman (1984) and Astin (1980) have suggested that there are multiple reasons for student selection of an educational institution or setting.

The preceding review of the theoretical bases for this study provides the background against which hypotheses and research questions were posed.

The 16 hypotheses and two questions, reflecting the five objects of the study, were as follows (Gable, 1985):

1. Students who have a preference for Extraversion will be enrolled in programs such as Radiological Technology, Respiratory Therapy, Occupational Therapy, Dental Assisting, Medical Assisting, or Surgical Technology.

2. Students who have a preference for Introversion will be enrolled in programs such as Medical Technology, Physical Therapy, Dental Hygiene, Medical Records, or Medical Laboratory Technician.

3. Students who have a preference for Sensing will be enrolled in Dental Assisting, Dental Hygiene, Radiographer, Radiological Technician, Medical Laboratory Technician, Medical Technology, Physical Therapy, Physical Therapy Assisting, Medical Assisting, or Surgical Technician programs.

4. Students who have a preference for Intuition will be enrolled in Occupational Therapy, Medical Records, Respiratory Therapy, or Respiratory Therapy Technician programs.

5. Students who have a preference for Thinking will be enrolled in programs such as Respiratory Therapy, Respiratory Therapy Technician, Medical Laboratory Technician, Medical Records, Radiographer, Radiological Technician, or Surgical Technician.

6. Students who have a preference for Feeling will be enrolled in programs such as Dental Assisting, Dental Hygiene, Medical Assisting, Occupational Therapy, Physical Therapy, or Physical Therapy Assisting.

7. Students who prefer Judging will be enrolled in Medical Records, Dental Assisting, Dental Hygiene, Radiological Technician, Radiographer, Medical Assisting, Medical Laboratory Technician, Medical Technology,

Physical Therapy and Physical Therapy Assistant or Surgical Technician programs.

8. Students who prefer Perception will be enrolled in Occupational Therapy, Respiratory Therapy, and Respiratory Therapy Technician programs.

9. Students who have preferences for Introversion will be found in the 4-year college and university settings of the health occupation education programs.

10. Students who prefer Sensing will likely be found in hospitals, junior colleges, community colleges, or vocational/technical educational settings for their health occupational programs.

11. There is no relationship between scores on the preference scales and the ages of students.

12. Males have lower Feeling preference scores than females.

13. There is no relationship between race and preference scores.

14. Students who have a preference for Intuition will have a higher high school grade point average.

15. Students who have a preference for Judgment will have a higher high school GPA than those with a preference for Perception.

16. Students who have a preference for Introversion will have parents with college educational experience.

Q-1. What is the relative importance of the biographical items and the preferences on the four scales upon the enrollment in the various health occupation education programs?

Q-2. What is the relative importance of each biographical item, preferences on the four scales, and selection of a health occupation program upon the selection of an educational site?

Research Methodology

A stratified cluster sample technique (Borg & Gall, 1984; Hinkle, Wiersman, & Jurs 1979) was used. The sample, as shown in Tables 1 and 2, consisted of 1,187 (%82) students enrolled in 88 (92%) post-secondary educational programs for the 15 selected health occupations and the three types of educational settings in the state of Indiana.

Table 1

Distribution of Student Enrollment Within Selected Health Occupations Education Programs

Occupation	Student Number	% Total
Dental Assisting	99	8
Dental Hygiene	88	7
Medical Assisting	183	15
Medical Laboratory Technician	114	10
Medical Records	53	4
Medical Technology	153	13
Occupational Therapy	42	4
Physical Therapy Assisting	27	2
Physical Therapy	70	6
Radiological Technology	83	7
Radiographer	92	8
Radiography Technician	7	1
Respiratory Therapy	72	6
Respiratory Therapy Technician	72	6
Surgical Technician	33	3
Totals	1,187	100

All students who were actively enrolled in the first year of their HOE program were invited to participate in the study if their program director had expressed cooperation.

Table 2

Distribution of Health Occupation Education Programs and Students in Institutional Settings

Setting	# (%) Programs		# (%) Students	
Hospital	27	(31%)	188	(16%)
Junior/Community College, Vocational-Technical Institution	26	(29%)	450	(38%)
4-Year College, University	35	(40%)	549	(46%)
Totals	88	(100%)	1187	(100%)

Program directors and/or administrators were contacted by letters. Follow-up phone calls during October and November, 1984, reiterated the purpose of the study and the request for cooperation in the study. All but eight of the 96 program directors contacted expressed willingness to allow participation of their students.

The data collection technique chosen for the study was a written questionnaire. The instrument was used to obtain the information from all subjects in the cluster sample. The tool was a modification of the 126 item Myers-Briggs Type Indicator, Form G. The addition of 16 forced-choice items regarding HOE programs, educational settings, and biographical information, did not impinge upon the general format of the instrument.

A total of 1,188 response sheets was returned of which 1,187 or 99.9% were usable. Each response sheet was scored twice, during the month of January, 1985, and each score was tabulated twice independently, in an effort to assure accuracy. Procedural verification of the transfer of data to computer-ready format was also done. Each step of scoring, tabulation, and computer input processing was double-checked and cross-checked. Data were keypunched onto computer cards during February and the data file was created using the Statistical Package for the Social Sciences (SPSS) and the CDC Cyber 170/855 computer facilities at Indiana University. Data were analyzed using Zero-based correlations, ANOVAs, t-tests, multiple regression, and discriminant analysis.

Twenty variables were used based on biographical information--race, education of parents, highest grade completed, high school GPA, and reasons for selecting the educational site--, occupational group, educational setting, and preference type and continuous scores as defined by McCaulley (1980). Measures were based on the self-reported responses of the participants.

Research Findings and Recommendations

The major findings of the study fall into three categories. The first group is related to the differentiation of the health occupations by preferences. The significance of t-distribution scores for the health occupations on the basis of preferences was found to be at the $p < .05$ level for all four scales except for Physical Therapy on the Extraverson/Introversion, Medical Laboratory Technician on the Thinking/Feeling, and Occupational Therapy and Radiographer on the Judging/Perception scales. Specific health occupations, for example, Radiological Technology, Respiratory Therapy, Occupational Therapy, Physical Therapy, Dental Hygiene and Dental Assisting, had group means indicative of preference for Extraversion. Medical Records, Medical Technology, and Medical Laboratory Technician had group means indicating a preference for Introversion as can be seen in Table 3.

Table 3

Calculation of t Scores for EI Continuous Scores of Students in Selected Health Occupations

Category	Sample Mean ($\overline{X}$)	Hypothesized Value of Mean (u)	($\overline{X}$-u)	t-score ($\overline{X}$-u)/SEa
Dental Assisting	93.5455	100.0000	-6.4545	-9.0273***
Dental Hygiene	91.3864	100.0000	-8.6136	-12.0470***
Medical Assisting	98.2787	100.0000	-1.7213	-2.4074*
Medical Lab Technician	103.5088	100.0000	3.5088	4.9074***
Medical Records	101.7170	100.0000	1.7170	-2.4014*
Medical Tech.	101.7974	100.0000	1.7974	-2.5138*
Occupational Therapy	95.4286	100.0000	-4.5714	-6.3936***
Physical Therapy Assisting	95.1481	100.0000	-4.8519	-6.7859***
Physical Therapy	99.8000	100.0000	-0.2000	-0.2797
Radiological Technology	93.8434	100.0000	-6.1566	-8.6106***
Radiographer	93.2609	100.0000	-6.7391	-9.4253***
Radiography Technician	104.3333	100.0000	4.3333	6.0606***b

(table continues)

Table 3 (continued)

Category	Sample Mean ($\overline{X}$)	Hypothesized Value of Mean (u)	($\overline{X}$-u)	t-score ($\overline{X}$-u)/SEa
Respiratory Therapy	97.1389	100.0000	-2.8611	-4.0015**
Respiratory Ther. Technician	94.8889	100.0000	-5.1111	-7.1484***
Surgical Technology	101.3030	100.0000	1.3030	1.8224

Note. Number of cases involved: 1,187

[a]Standard Error for EI continuous scores: .715

[b]Only six students were in the Radiography Technician category

Critical values for 14 degrees of freedom:
* $p < .05 = 2.145$
** $p < .01 = 2.977$
*** $p < .001 = 4.140$

All of the health occuational majors had group means reflective of preferences for Sensing. All t-scores were significant at $p < .001$ except Occupational Therapy which had a group mean for Sensing which was less strong and a t-score which was significant at $p < .05$ as shown in Table 4.

All of the occupational groupings had scores indicative of preferences for Feeling with a differentiation of the group means as presented in Table 5. The Medical Laboratory Technician category had the weakest preference for Feeling while the Occupational Therapy Group had the strongest.

Table 4

Calculation of t-scores for SN Continuous Scores of Students in Selected Health Occupations

Category	Sample Mean ($\bar{X}$)	Hypothesized Value of Mean (u)	($\bar{X}$-u)	t-score ($\bar{X}$-u)/SE[a]
Dental Assisting	87.4242	100.0000	-12.5758	-18.0428***
Dental Hygiene	80.4318	100.0000	-19.5682	-28.0749***
Medical Assisting	85.3169	100.0000	-14.6831	-21.0661***
Med. Lab. Tech.	93.3333	100.0000	-6.6670	-9.5653***
Medical Records	86.5849	100.0000	-13.4151	-19.2469***
Med. Technology	95.0654	100.0000	-4.9346	-7.0798***
Occupational Ther.	98.4762	100.0000	-1.5238	-2.1862*
Physical Ther. Asst.	81.5926	100.0000	-18.4074	-26.4095***
Physical Therapy	88.5714	100.0000	-11.4286	-16.3968***
Radiological Tech.	91.3133	100.0000	-8.6867	-12.4630***
Radiographer	89.2174	100.0000	-10.7826	-15.4700***
Radiography Tech.	83.0000	100.0000	-17.0000	-24.3902***[b]
Respiratory Therapy	95.4167	100.0000	-4.5833	-6.5758***
Resp. Ther. Tech.	92.5278	100.0000	-7.4722	-10.7205***
Surgical Technician	82.8788	100.0000	-17.1212	-24.5641***

Note. Number of cases = 1,187

[a] Standard Error for SN continuous scores: .697

[b] Only six students were in the Radiography Technician category

Critical values for 14 degrees of freedom:
* $p < .05 = 2.145$
** $p < .01 = 2.977$
*** $p < .001 = 4.140$

Table 5

Calculation of t-scores for TF Continuous Scores of Students in Selected Health Occupations

Category	Sample Mean ($\bar{X}$)	Hypothesized Value for Mean (u)	($\bar{X}$-u)	t-score ($\bar{X}$-u)/SE[a]
Dental Assisting	113.7273	100.0000	13.7273	23.3457***
Dental Hygiene	110.7727	100.0000	10.7727	18.3209***
Medical Assisting	107.4153	100.0000	7.4153	12.6111***
Med. Lab. Tech.	100.2632	100.0000	0.2632	0.4476
Medical Records	102.6981	100.0000	2.6981	4.5886***
Med. Technology	102.5163	100.0000	2.5163	4.2794***
Occupational Ther.	114.2381	100.0000	14.2381	24.2145***
Physical Ther. Asst.	110.5556	100.0000	10.5556	17.9517***
Physical Therapy	109.5143	100.0000	9.5143	16.1808***
Radiological Tech.	101.5060	100.0000	1.5060	2.5612*
Radiographer	104.2609	100.0000	4.2609	7.2464***
Radiography Tech.	105.3333	100.0000	5.3333	9.0702***[b]
Respiratory Therapy	101.4167	100.0000	1.4167	2.4094*
Resp. Ther. Tech.	104.3056	100.0000	4.3056	7.3224***
Surgical Technician	105.9697	100.0000	5.9697	10.1526***

Note. Number of cases = 1,187

[a] Standard Error for TF continuous scores: .588

[b] Only six students were in the Radiography Technician category

Critical values for 14 degrees of freedom:
* $p < .05 = 2.145$
** $p < .01 = 2.977$
*** $p < .001 = 4.140$

Only the Respiratory Therapy group had a mean indicative of a preference for Perception. The Occupational Therapy and Radiological Technology categories had means indicating a very weak preference for Judging. The other groups had means differentiated on the Judging side of the scale with Medical Records having the strongest preferences as can be seen in Table 6.

Table 6

Calculation of t-scores for TF Continuous Scores of Students in Selected Health Occupations

Category	Sample Mean ($\bar{X}$)	Hypothesized Value for Mean (u)	($\bar{X}$-u)	t-score $(\bar{X}-u)/SE^{a}$
Dental Assisting	95.3434	100.0000	-4.6566	-6.1595***
Dental Hygiene	89.1591	100.0000	-10.8409	-14.3398***
Medical Assisting	96.1803	100.0000	-3.8197	-5.0525***
Med. Lab. Tech.	96.7018	100.0000	-3.2982	-4.3627***
Medical Records	88.6981	100.0000	-11.3019	-14.9496***
Med. Technology	91.7974	100.0000	-8.2026	-10.8500***
Occupational Ther.	99.7143	100.0000	-0.2857	-0.3779*
Physical Ther. Asst.	93.1481	100.0000	-6.8519	-9.0634***
Physical Therapy	91.9714	100.0000	-8.0286	-10.6198***
Radiological Tech.	99.3373	100.0000	-0.6627	-0.8766
Radiographer	97.0652	100.0000	-2.9348	-3.8820**
Radiography Tech.	83.6667	100.0000	-16.3333	-21.6049***b
Respiratory Therapy	101.7778	100.0000	1.7778	2.3516*

(table continues)

Table 6 (continues)

Category	Sample Mean ($\overline{X}$)	Hypothesized Value for Mean (u)	($\overline{X}$-u)	t-score ($\overline{X}$-u)/SEa
Resp. Ther. Tech.	96.0556	100.0000	-3.9444	-5.2175***
Surgical Technician	90.4545	100.0000	-9.5455	-12.6263***

Note. Number of cases = 1,187

[a] Standard Error for JP continuous scores: .756

[b] Only six students were in the Radiography Technician category

Critical values for 14 degrees of freedom:

* $p < .05 = 2.145$
** $p < .01 = 2.977$
*** $p < .001 = 4.140$

The second group of findings of this study is related to the differentiation of educational settings/sites by the scores of the students enrolled. The preferences for Sensing were found to be significant at the $p < .01$ level and differentiation among the sites on this scale was also highly significant ($p < .001$). Specifically, students preferring Introversion were not found to be located in 4-year college/university settings significantly more than the other settings as prior research indicated. Students preferring Sensing were found to be enrolled in hospital and vocational-technical or junior, community colleges.

The final group of findings focused upon the relationships between the biographical items, continuous scores, the choice of health occupations educational major, and the selection of educational site. Gender and age were found to be related to preference scores. As the age of the student increased, the scores indicated preferences for Introversion, Thinking, and

Judging. Continuous scores on the Thinking/Feeling scale were less for males, indicating preferences for Thinking, than those for females. This finding was anticipated and supported prior research studies.

There did appear to be a relationship between the Extraversion/Introversion continuous scores and the Black categorization for ethnicity. Possible relationships between ethnicity and Sensing or Judging preferences also exist on the basis of the t-distribution test. However, the lack of frequencies in the non-white categories resulted in the inability to perform statistical tests with a strong degree of confidence.

No relationship was found between continuous scores on the Sensing/Intuition scale and the high school grade point average. These findings were unanticipated because of results obtained in other research studies. However, the sample's strong preference for Sensing may have represented students who generally are academically successful Sensing types rather than a general population of academically successful types who might reflect a preference for Intuition.

Relationships between high school GPA and scores occurred on the Thinking/Feeling and Judging/Perception scales were found. In essence, as the preferences for Judging and Feeling increased, the high school GPA increased.

The findings regarding the relationship of the student preferences for Introversion and the educational backgrounds of the parents indicated that as the educational level of the mother increased, the student scores indicated a greater preference for Extraversion. A similar finding resulted when the educational level of the father was correlated with the preference score.

The highest grade level completed correlated with the continuous scores on three scales. The preferences of students who had completed the higher levels of grade completion indicated preferences for Extraversion, Sensing, and Judging.

Four relationships between the importance of the reasons for the selection of the educational site and the preferences were found to be significant. Students having the least preference for Extraversion rated proximity to home and the availability of an HO program and financial aid as having high importance to them. High importance given to the availability of the HO program and financial aid was found to be indicative of students with the strongest preference for Sensing. Those students with stronger preferences for Feeling indicated that the influence of family and availability of an HO program had high importance. Stronger preferences for Judging were found to be reflected in the rating of high importance for proximity to home, availability of HO program, cost, and availability of financial aid. Only the mean scores of the Extraversion/Introversion scores across the importance ratings were found to be significant when an ANOVA was used. It was found that the high importance upon the opportunity to avail oneself of financial assistance was indicative of continuous scores reflecting a preference for Introversion.

The relative importance of relationships found between the biographical items, preferences, and the occupational major as well as between biographical items, preferences, health occupations educational major, and the educational site was found. Gender, age, and education of the father were found to have significant influences on the EI scores. Preferences for Extraversion had significant influence on the enrollment in the Dental, Radiological Sciences, or Respiratory Therapy programs. Six variables were significantly associated with variance in the Sensing/Intuition scores. Only one variable--gender--was found to be related to Intuition as males tended to prefer Intuition. The remaining five variables were found to be associated with the Sensing preferences. Enrollment in one of the four generic occupational areas of Dental, Physical Therapy, Medical Assisting, or Surgical Technology and the enrollment in the hospital setting were associated with Sensing scores.

Thinking/Feeling scores were significantly related to four variables. Males were found to prefer Thinking, while preferences for Feeling were found to be related to enrollment in the areas of Dental, Physical Therapy, and Occupational Therapy.

Preferences for Judging or Perception were found to be significantly associated with age, highest grade completed, high school GPA, and enrollment in the Dental or Physical Therapy programs. All five variables were positively related to preferences for Judging.

The ability to significantly predict group membership for health occupation or site if biographical items and preferences are known was demonstrated. There is a significant relationship between the health occupational program within which a student enrolls and (a) four biographical items--age, sex, grade completed, and high school GPA--, (b) reasons for selection of an educational site--proximity to home, influence of the family, availability of an HO program, opportunity to work while a student, cost, and the availability of financial aid--, and (c) educational side. The relative importance of each biographical item, continuous scores, and enrollment in various health occupational categories upon the selection of an educational site was also studied. The findings indicated that 13 variables had significant relationships. These included (a) three biographical items--gender, education of mother, and highest grade completed--, (b) generic health occupation, (c) four reasons for selection of a site--influence of family, cost, some importance given to work or availability of financial aid, and the presence of a HO program--, and (d) continuous scores on the Sensing/Intuition scale indicating a preference for Sensing.

The use of continuous scores significantly improved the predictability of group membership in the site categories by 24.5%. This increase demonstrated the ability to foresee the choice of site if the continuous scores on all four scales are known; the SN scores were significant in differentiating between the sites. Using scores improved the predictability of membership in generic health occupation groups by 22.2%. The EI, SN, and TF scores were found to be significant in differentiating between occupations.

Based upon the findings of this study and the practical importance to administrators and faculty of health occupation programs in post-secondary institutions, the five following recommendations were made (Gable, 1985).

1. Because students enrolled within the selected health occupations have been found to be different in their preferences on all four scales of the MBTI, administrators and faculty need to be aware that inter-disciplinary courses may be advantageous for some groups of students. Faculty should be encouraged to use a variety of instructional strategies which could facilitate learning for all of the health occupational groups.

2. While the health occuational groups may be differentiated on the preference scales, individual students in a given program are different in

fundamental ways as well. Some individual allowance for variation in instructional methods and strategies could facilitate the learning of more students. Attempts to teach all students by using single instructional modes are inappropriate and do not promote the learning process (Cross, 1976; Dunn, 1985; Myers, 1980). Administrators could increase the effectiveness of the educational programs by urging faculty members to consider individual student preferences when implementing instructional plans to facilitate student learning.

3. Because students differ, administrators should encourage self-awareness of preferences of faculty members. Awareness and recognition of their own preferences could enable faculty to better understand their participation in the interactive process of learning.

4. Program directors and administrators should recognize the differentiation by site of student preferences for Sensing/Intuition and Thinking/Feeling. The hospital and junior/community college/vocational-technical institutional settings appear to attract students who prefer the details, consistency in procedures, and skills in the psychomotor realm. Consequently, instructional methods and counseling processes should reflect the recognition of these preferences.

5. Counselors and faculty who are involved in career counseling should recognize the differentiation of health occupational groupings studied differed on each of the four preference scales. The use of the profile as a discriminating criterion of occupational consideration or program application is not advocated; the use of the general knowledge of preferences which appear to be characteristic of health occupational choice is recommended.

These recommendations are made in the effort to identify potential ways to increase the effectiveness and efficiency of health occupations or allied health educational programs. Application of the suggestions could enable administrators and faculty to respond to concerns for the quality and cost-effectiveness of their educational programs. It should be recognized that these recommendations may not be applicable to HOE programs or sponsoring educational institutions in general. The sample used in this study was restricted to the fifteen selected health occupations having the largest percentage of health occupational programs, and to the geographical boundaries of one state. The sample did not represent the numerous health occupational categories with lower enrollments, the settings of proprietary schools, consortia, secondary schools, or federal governmental institutions including the military, nor the nation generally.

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Attitudes Toward Disabled Persons as Perceived by Health Occupations Classroom Teachers

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Attitudes Toward Disabled Persons As Perceived by Health Occupations Classroom Teachers

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Abstract: The purpose of the research was to study the effects of different instructional strategies and selected demographic variables on experienced health occupations teachers' attitudes toward disabled persons. A pretest/posttest experimental design was utilized with three groups of randomly assigned participants. The treatment consisted of instruction by independent study, lecture, and film on identical information pertaining to disabled persons. Manova produced no significant sources although proportions of variance accounted for by the sub-scale scores were .89 for "Personality Characteristics Sub-scale," .85 for "Special Treatment Sub-scale," and .93 for "Disabled in School Sub-scale." A sequential partitioning of the sums of squares in univariate analyses was performed. There were pretest-posttest differences; differences due to varying years of occupational experience, to number of courses studied, to years of teaching experience, and to highest degree attained. Analyses of variance showed no significant differences between the three different methods of instructional strategies. Other findings revealed that special coursework taken to teach handicapped students contributed to a positive attitude toward disabled students. It is suggested that

states continue to require special preparation for all teachers who teach handicapped students.

Public Law 94-142 calls for handicapped children to be educated whenever appropriate with non-handicapped children. This policy depends on local educators and administrators to make the determination of appropriate placement with the child's parents. The education of administrators and teachers must prepare them to participate meaningfully in this process (Martin, 1978).

Numerous studies have been completed that attest to the need for improvement of inservice vocational development in the area of serving handicapped youth (Brolin, 1976, Faulkner, 1975, Gearhart, 1976, & Wall, 1976). Most states have provided special inservice, workshops, or other means to provide teachers training in this problem area. Although approximately 70% of all children identified as handicapped spend some portion of their school day in regular classrooms (Lakin, 1983) insufficient studies have been conducted to determine teacher attitudes toward the handicapped or to evaluate the best means to provide inservice education concerning education of the handicapped in the regular educational setting (Iverson & Davis, 1981).

Hughes (1978) felt that given proper information and training teachers would develop a more positive attitude toward the handicapped student. Donaldson and Martinson (1977) found that preservice teachers' attitudes toward handicapped students were improved by exposing the teachers while they were in training to situations involving disabled students. Higgs

(1975) also found that a combination of information and contact with a handicapped person were of great benefit in improving a teacher's understanding and attitude.

In 1979, Bruwelheide wrote: "The greatest barriers may be those which are not immediately seen, those of administrator and teacher attitude, anxiety, and non-understanding of the handicapped individual" (p. 5). Traditionally, health care professionals have been prepared for engaging in treatment of medical needs of clientele groups that may have included handicapped persons. This study focuses on health care professionals engaged in providing education and training to handicapped students preparing for entry into health careers. In particular, this study is concerned with attitude toward handicapped students.

Since public education has only recently opened for health occupations courses and since the teachers of those courses may not be well prepared to serve handicapped students who have chosen these programs, a study of attitudes might be helpful for understanding classroom environments in which handicapped students may find themselves. Should those environments be less than desirable, such a study might also suggest areas for additional professional preparation for health occupations teachers. Moreover, among other studies, the International Association for Evaluation of Achievement in Education study of classroom environments has demonstrated that the teacher is a very important contributor to variance in student achievement (Regan & Anderson, 1984).

Purpose of the Study

The primary purpose of this study was to apply a popular measure of attitude toward handicapped persons of experienced health occupations education teachers and to determine whether those attitudes are malleable under different limited instructional strategies. The secondary purpose of this study was to determine what relationships exist between selected demographic variables and observed differences in teacher attitude toward handicapped persons.

Methodology

Secondary school Health Occupations teachers employed in vocationally reimbursed programs as instructors in allied health cluster curriculum (multiple-competency) programs were participants in this study. These experienced health occupations teachers, with educational backgrounds in medical technology, pharmacy, respiratory therapy, dental assisting, and registered nursing, were randomly assigned to three groups and the groups were randomly assigned treatment in a one-hour session which consisted of self-paced independent study (n = 15), lecture with discussion (n = 14) and a film (n = 15), all with identical conceptual content dealing with problems and needs of physically disabled persons. Conceptual content for the three sessions was controlled by the film, The Invisible Barrier (Disability Information Center) which was used unedited. A self-paced instructional module for independent study was constructed from the verbal and visual conceptual content of the film. A narrative transcription of the film for traditional lecture was developed with supplemental verbal descriptions of those concepts visually presented. Three weeks prior to an annual summer professional development workshop for all high school health occupations teachers, pretests were mailed to the teachers with a request for their participation in the study. Sixty-two percent of the teachers volunteered to be included in the study as a part of their three-day workshop. No other session related to the handicapped was held. The three groups were treated in regular classrooms at the workshop site. The three treatments occurred simultaneously under supervision of three professional educators. Educators in the film and independent study groups assured that participants attended to the task. The educator in the lecture group presented the lecture. There was a prior meeting of the three educators who facilitated the treatments to discuss procedures that would ensure effective control for the three presentations to be as identical as possible.

Posttest data collection was completed immediately following the one-hour treatment session. After the data were collected, the purpose of the study was explained to all participants.

In order to guide the study, three null hypotheses were generated and tested:

Ho_1 The scores of health occupations teachers will not differ significantly from neutral (item means equal to 3) on the Attitudes Toward Disabled Persons (ATDP) instrument.

Ho_2 There will not be a significant difference between the three methods of instructional strategies (independent study, lecture, and film) in causing modification of health occupations teachers' attitudes toward the disabled as measured by the ATDP instrument.

Ho_3 The pretest/posttest ATDP scores among health occupations teachers will not differ statistically for selected demographic variables.

Instrumentation

A validated attitude assessment, "Attitudes Toward Disabled Persons" (ATDP) was selected for the study (Yuker, Block & Campbell, 1960). The original instrument contained 30 items in two sub-scales. Five items relating to vocational education were added to the ATDP instrument by Iverson and Davis (1981) in order to clarify views of the teachers toward specific educational situations. The revised 35-item ATDP instrument has three sub-scales. The Personality Characteristic Sub-scale has 19 items specifically referring to similarities or differences in Personality Characteristics of disabled persons. The Special Treatment Sub-scale has 11 items dealing with the special treatment of disabled persons. Five of the items refer to special treatment in educational situations and these five items comprise the Disabled in School Sub-scale. The ATDP instrument uses a 1-5 Likert scale, with 1 being strongly disagree and 5 being strongly agree. The sense of scaling for some of the Likert items was reversed before those items were accumulated into sub-scale scores in the multivariate analyses. Missing data from individual response categories were eliminated in the data analysis by listwise deletion in the GLM procedure of SAS. Listwise deletion resulted in the loss of seven cases for a final n of 81.

Reliabilities of the instrument in this study ranged from .93 for all 35 items to .78 for the five-item Disabled in School Sub-scale using Cronbach's Coefficient Alpha. Content validity has been established by comparisons with other studies (Trussell, N. J. Walters, Davis, Avery, F. T. Walters, & Williams, 1984).

Results and Discussion

Table 1 summarizes pretest and posttest response means for the three sub-scales of the ATDP. The overall pretest mean for the Personality Characteristic Sub-scale was 54.11 (SD = 4.45), for the Special Treatment Sub-scale was 29.87 (SD = 2.30), and for the Disabled in School Sub-scale was 18.07 (SD = 3.44). Pretest means for the Personality Characteristic Sub-scale broken down by categories of the independent variables ranged from 45.00 to 58.00, for the Special Treatment Sub-scale from 25.50 to 33.00, and for the Disabled in School Sub-scale from 11.00 to 23.00.

The overall posttest mean on the Personality Characteristic Sub-scale Posttest mean was 53.81 (SD = 4.60) while means for the same sub-scale broken down by categories of the independent variables ranged from 44.00 to 58.00. The Special Treatment Sub-scale Posttest mean was 29.93 (SD = 2.52) and its breakdown of means ranged from 26.00 to 36.00. The Disabled in School Sub-scale Posttest mean was 18.93 (SD = 2.77) with breakdowns ranging from 11.00 to 25.00.

Manova procedures for Personality Characteristics, Special Treatment, and Disabled in School Sub-scales by Type of Score (observed vs. chance or neutral) indicated a difference in location for the two types. On the pretest, Wilk's Lambda was .44 ($p < .05$) and the posttest Wilks Lambda was .45 ($p < .05$). The univariate analysis revealed a significant F value for each of the three sub-scales. Therefore, null hypothesis one was rejected. The Personality Characteristics Sub-scale F value was 18.53 ($p < .05$) on the

Table 1

ATDP Scores Broken Down by Levels of Variables in the GLM Models

Source	N	ATDP Sub-scales											
		Personality Characteristics (19 items)				Special Treatment (11 items)				Disabled in School (5 items)			
		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Total Sub-scale Response	44	54.11	4.45	53.81	4.60	29.87	2.30	29.93	2.52	18.07	3.44	18.93	2.77
Group 1 (independent study)	15	53.60	4.63	53.27	5.16	29.87	2.59	28.60	2.72	18.20	3.36	19.13	3.68
Group 2 (lecture)	14	54.00	4.57	54.07	4.23	29.79	1.76	30.57	2.21	17.71	4.25	18.71	1.98
Group 3 (film)	15	54.73	4.38	54.14	4.62	30.00	2.59	30.71	2.13	18.27	2.84	18.93	2.50
Handicapped Family Member													
YES	9	54.33	4.00	53.92	2.71	30.11	1.69	30.42	2.02	17.78	3.53	18.67	2.54
NO	35	54.06	4.61	53.78	5.19	29.83	2.46	29.74	2.70	18.14	3.47	19.03	2.86
Occupational Experience													
None	4	55.00	6.83	55.00	6.08	29.00	1.41	27.67	2.89	15.50	4.65	18.00	3.61
1-4 years	5	50.80	5.40	51.50	5.89	31.80	1.79	30.83	2.64	21.60	1.67	20.17	1.72
5-10 years	17	55.12	4.28	53.07	5.13	29.65	2.74	29.67	2.74	17.65	3.18	18.73	3.20
Over 10 years	17	53.76	3.70	54.72	3.43	29.76	2.05	30.17	2.26	17.94	3.31	18.78	2.71
Special Coursework to Teach Handicapped Students													
YES	35	53.89	4.28	53.94	4.54	29.89	2.35	29.76	2.41	18.31	3.29	19.33	2.77
NO	9	55.00	5.22	53.22	5.31	29.89	2.26	30.44	3.09	17.11	4.04	17.89	2.42
Number of Special Courses Taken													
One course	21	54.14	4.66	54.00	4.34	29.71	2.28	29.50	2.07	18.81	2.82	19.73	1.73
Two courses	7	54.00	3.96	54.13	4.52	30.86	2.61	30.13	3.00	17.86	3.67	18.38	3.07
Three courses	2	56.00	2.83	44.00	----	27.00	2.83	28.00	----	16.50	6.36	25.00	----
Four courses	1	58.00	----	51.00	----	33.00	----	35.00	----	11.00	----	11.00	----
Five courses	1	49.00	----	54.00	----	30.00	----	31.00	----	21.00	----	21.00	----
Ten courses	1	49.00	----	43.00	----	29.00	----	29.00	----	21.00	----	20.00	----
Eleven courses	1	52.00	----	52.00	----	26.00	----	26.00	----	22.00	----	22.00	----

Table 1 (continued)

Source	N	ATDP Sub-scales											
		Personality Characteristics (19 items)				Special Treatment (11 items)				Disabled in School (5 items)			
		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
		M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Teaching Experience													
First year	2	56.00	8.49	56.00	3.49	30.50	2.12	30.50	2.12	18.50	4.95	18.50	4.95
1-4 years	19	54.00	5.29	53.26	5.46	29.26	2.64	29.32	2.21	18.68	3.32	19.32	2.87
5-10 years	18	55.22	2.49	55.00	3.67	30.39	2.06	30.24	2.61	17.28	2.95	18.47	2.98
Over 10 years	5	49.80	3.42	52.43	3.99	30.20	1.79	30.86	3.02	18.40	5.46	19.00	2.08
Experience Teaching Handicapped													
YES	37	53.78	4.34	54.06	4.72	29.95	2.36	30.14	2.44	18.00	3.67	18.39	2.78
NO	7	55.56	4.95	52.57	4.04	29.57	2.15	28.86	2.85	18.43	1.99	19.14	2.97
Highest Degree Earned													
Associate Arts	2	54.00	4.24	58.00	----	25.50	0.71	28.00	----	18.50	0.71	17.00	----
Bachelor's	15	55.20	4.59	54.08	5.45	29.80	2.86	30.38	2.29	16.40	3.60	18.46	3.23
Master's	11	54.18	4.75	54.92	3.50	30.00	2.00	29.62	2.60	18.27	2.83	18.85	2.76
AA Certification (Specialist)	1	45.00	----	45.00	----	32.00	----	36.00	----	23.00	----	19.00	----
Doctorate	2	50.00	1.41	52.00	----	30.50	0.71	29.00	----	20.50	0.71	18.00	----
Other	10	52.90	3.38	52.55	4.55	30.60	1.43	29.45	2.62	20.30	2.83	19.54	3.01

pretest and 20.79 ($p < .05$) on the posttest when the respondents' scores were compared with the neutral score. The F values on the Special Treatment Sub-scale were 80.30 ($p < .05$) on the pretest and 66.98 ($p < .05$) on the posttest. The pretest F value was 35.01 ($p < .05$) and the posttest F value was 85.28 ($p < .05$) on the Disabled in the School Sub-scale. These results are summarized in Table 2.

Analysis with general linear model procedures employing selected demographic variables in addition to Pretest/Posttest Type and Group indicated that the models overall were satisfactory, accounting for between about .85 (for Special Treatment) and .94 (for Disabled in School) of observed variabilities. However, because of multicollinearity in the data, the completely partialled variables uniquely did not account for significant proportions of variability. Therefore, the second and third null hypotheses were not rejected.

The procedure of choice for responding to the multicollinearity problem with these data was to assign the variability sequentially. The Pretest/Posttest Type and Group were entered first and second because of their potential contributions to the stated purposes of this study. It was reasoned that the presence of a handicapped family member might enhance favorable attitudes toward the handicapped. This experience would have preceeded all occupational and educational experiences, thus "Handicapped Family Member" was entered third.

For health occupations teachers the usual mode for entry into the professions is through completion of a health care training program. Subsequent to this the prospective teacher either would enter the teaching

Table 2

Analyses of Observed vs Chance Results of ATDP Data

Multivariate

Source	Wilk's Lambda	F_a	Numerator df	Denominator df	P
Pretest	.44	35.88	3	84	0.0001*
Posttest	.45	34.50	3	84	0.0001*

Univariate ATDP Sub-scales

Source	df	Personality Characteristics (19 items)					Special Treatment (11 items)					Disabled in School (5 items)				
		M	SS	MS	F	P	M	SS	MS	F	P	M	SS	MS	F	P
Pretest																
Observed Raw Score		54.11					29.89					18.07				
Expected Mean		57.00					33.00					15.00				
Model	1		183.28	183.28				213.28	213.28				207.10	207.10		
					18.53	0.0001*				80.30	0.0001*				35.01	0.0001*
Error	86		850.83	9.89				228.43	2.66				508.80	5.92		
Total	87		1033.72					441.72					715.90			
Posttest																
Observed Raw Score		53.86					29.84					18.86				
Expected Mean		57.00					33.00					15.00				
Model	1		216.41	216.41				219.56	219.56				328.41	328.41		
					20.79	0.0001*				66.98	0.0001*				85.28	0.0001*
Error	86		895.18	10.41				281.89	3.28				331.18	3.85		
Total	87		1111.59					501.44					659.59			

*Significant at alpha = .05 level

Note: Neutral response equals number of items in each sub-scale multiplied times 3.

profession directly or would attain varying levels of educational proficiency, then enter the teaching profession. Therefore, "Years of Occupational Experience" was entered fourth. "Courses" (had or did not have special courses for teaching the handicapped) and "Number of Courses" (special courses) were then entered fifth and sixth into the model.

Teaching experiential variables were entered seventh following the special coursework because of the requirement for coursework in the teacher certification process. The act of having taught a handicapped student would be more likely with increase in the number of years of teaching experience. Finally, "Highest Degree Earned" was added since it is an important variable for determining compensation and status for practicing teachers.

The univariate analysis shown in Table 4 post hoc to the multiple analysis of variance procedure, Table 3, indicated that years of occupational experience, number of special courses taken to teach handicapped students, years of teaching experience, and highest degree earned contributed significantly to the explanation of variance on the Personality Characteristic Sub-scale (Model $F = 2.73$, $\underline{p} < .05$). On the Disabled in School Sub-scale the pretest/posttest effect, years of occupational experience, special coursework taken, number of special courses taken, and highest degree earned explained a significant amount of the variance (Model $F = 4.82$, $\underline{p} < .05$). The model for the univariate analysis on the Special Treatment Sub-scale was not significant (Model $F = 1.87$, $\underline{p} < .06$). However, years of occupational experience was significant ($F = 3.45$, $\underline{p} < .03$).

From the table of means it may be observed that the posttest scores were higher (m = 18.93) than the pretest scores (m = 18.07) on the Disabled in School Sub-scale. Scheffé post hoc testing revealed that participants with one to four years of occupational experience responded significantly higher (m = 21.60) than teachers with no occupational experience (m = 15.50), with five to 10 years occupational experience (m = 17.65), and with over 10 years of occupational experience (m = 17.94) on the Disabled in School Sub-scale. In addition, teachers that had taken one special course to teach handicapped students (m = 18.81) responded more positively than teachers who had taken two special courses (m = 17.86).

On the Personality Characteristic Sub-scale, teachers with five to 10 years teaching experience were significantly more positive (m = 55.22) than teachers with over 10 years teaching experience (m = 49.80). Also, baccalaureate (m = 55.20) and master degree (m = 54.18) teachers were more positive than specialist degree teachers (m = 45.00).

Participants who had other degrees or diplomas (such as the Associate in Science degree and the diploma nurse program leading to a licensure/certification in health care) responded more positively (m = 20.30) than did baccalaureate degree teachers (m = 16.40) on the Disabled in School Sub-scale.

While overall effects of the different teaching strategies and the selected demographic variables were not significant, the post hoc analysis has provided results that help in understanding the variance of experienced health occupations teachers' attitudes toward the handicapped.

Table 3

MANOVA for Personality, Special Treatment and Disabled in School Sub-scales

Source	Wilk's Lambda	F_a	Numerator df	Denominator df	P
Pretest/Posttest	.96	.24	3	18	.87
Group Teaching Strategy	.74	.97	6	36	.46
Handicapped Family Member	.99	.05	3	18	.98
Years of Occupational Experience	.83	.40	9	43	.93
Special Coursework	.85	1.03	3	18	.40
Number of Courses (special coursework)	.61	.82	12	47	.63
Years of Teaching Experience	.86	.31	9	43	.97
Experience Teaching Handicapped	.98	.13	3	18	.94
Highest Degree	.81	.45	9	43	.90
Pretest/Posttest by Group	.84	.56	6	36	.76

Table 4

Univariate Analyses of Scores on ATDP by Personality Characteristics, Special Treatment, and Disabled in School Sub-scales

Source	df	Personality Characteristics				Special Treatment				Disabled in School			
		SS	MS	F	P	SS	MS	F	P	SS	MS	F	P
Model	60	1495.13	24.92	2.73	.01*	413.79	6.90	1.87	0.06	729.12	12.15	4.82	0.00*
Error	20	182.30				73.77	3.68			50.43	2.52		
Total	80	1677.43				487.56				779.55			

*Significant at alpha = .05 level

Source	df	Personality Characteristics			Special Treatment			Disabled in School		
		Type I SS	F	P	Type I SS	F	P	Type I SS	F	P
Pretest/ Posttest	1	0.12	0.01	0.90	0.05	0.01	0.90	11.56	4.58	0.04*
Group Teaching Strategy	2	12.40	0.68	0.51	22.83	3.10	0.06	0.44	0.09	0.91
Handicapped Family Member	1	1.45	0.16	0.69	3.05	0.83	0.37	8.78	3.48	0.07
Years of Occupational Experience	3	107.01	3.91	0.02*	38.22	3.45	0.03*	84.10	11.12	0.00*
Special Coursework	1	1.87	0.21	0.65	3.50	0.95	0.34	34.80	13.80	0.00*
Number of Courses (special)	8	207.56	2.85	0.02*	69.70	2.36	0.05*	205.12	10.17	0.00*
Years of Teaching Experience	3	90.77	3.32	0.04*	25.49	2.30	0.10	2.08	0.28	0.84
Experience Teaching Handicapped	1	0.02	0.00	0.96	3.01	0.82	0.37	0.61	0.24	0.62
Highest Degree	6	158.25	2.89	0.03*	31.40	1.42	0.25	107.08	7.08	0.00*
Pretest/ Posttest by Group	2	9.86		0.59	19.87	2.69	0.09	2.14	0.42	0.65
Number (group)	32	905.76	3.11	0.00	196.61	1.67	0.11	272.37	3.38	0.00
		R-Square 0.891			R-Square .849			R-Square 0.935		

*Significant at alpha = 0.05 level

Conclusions and Recommendations

The results of the study indicated that the health occupations teachers that participated responded slightly less than positive to the ATDP instrument. This finding was contrary to the findings of Trussell, Walters, et al. (1984) and Iverson and Davis (1981) using the same instrument. Therefore, further study, specifically with health occupations teachers should be conducted. A more broadly based study should be undertaken, perhaps a study involving teachers accessible through an interstate agency.

Selected demographic variables were helpful sequentially for the overall explanation of variance on the attitude of health occupations teachers toward the handicapped. Specifically, the number of years of occupational experience, special coursework taken to teach handicapped students, number of special courses taken, number of years teaching experience, and highest degree earned contributed to understanding of variance on the sub-scales of the ATDP instrument.

The finding that the health occupations teachers were slightly less positive than expected from chance answering on the Personality Characteristic Sub-scale and the Special Treatment Sub-scale may be explained by the nature of the admission requirements to enter and succeed in health careers. Another factor, which may be considered, is the concept of mainstreaming the handicapped that has increased the stress on all teachers in achieving successful placement of students regardless of ability. Therefore, it is recommended that the health occupations student be assessed for abilities needed to enter and succeed in health occupations programs. However, the Disabled in School Sub-scale scores were on the positive side of chance which may indicate a willingness to provide for handicapped students educational opportunities appropriate for their abilities.

Other findings revealed that special coursework taken to teach handicapped students contributed to a positive attitude toward the disabled student. Therefore, it is suggested that State Departments of Education continue to require special preparation for credentialing all teachers who teach handicapped students.

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The Role of Patients and Employers of Nurses In B.S.N. Curriculum Development

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The Role of Patients and Employers of Nurses In B.S.N. Curriculum Development

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Abstract: This study focused on the question of what role do the constituencies of nursing education, patients and nurse employers have in curriculum development. A national survey to determine current practices and perceptions of baccalaureate nurse educators (N = 315) relative to participation of these two groups in curriculum development was undertaken. Responses about strategies used to obtain information and the amount and use of information were tabulated and analyzed. Frequencies were reported on all data including demographic characteristics, informational strategies, degree of assistance by various interest groups, and degree of impact on specified program purposes. Findings suggest that informal strategies are most frequently utilized, perceived faculty curriculum expertise is important in using and obtaining information from two interest groups, and selected classification variables influence some informational strategies.

Nursing educators are accountable both to the public as consumers and persons engaged in the practice of the discipline. The need to keep the curricululm relevant and current in terms of nursing practice is vital, and employers of nurses and patients possess valuable data needed in curriculum development.

Background

Educators at all levels are concerned about their relationship with the public. Elementary and secondary schools seek parental involvement and support. Faculty in higher education are cognizant of the need for relevancy in the curriculum and fulfillment of the service mission of the colleges and universities with the community.

Curriculum development practitioners typically support the involvement of persons other than teachers in the curriculum development process. Basic curriculum texts discuss, to varying degrees, the participation of interest groups in curriculum design. Methods and organization for involvement are often delineated. Doll (1982) states that the participation of persons other than teachers is a fact rather than a question. The degree and method of participation of various groups concerned about curriculum should be the issue. In advocating a needs assessment approach to curriculum making, Pratt (1980) indicates that this process involves various persons concerned with schooling. Three groups of persons are specifically mentioned: persons with specific prerogatives, persons with influence, and persons with special and relevant knowledge. Eisner (1979) notes that a variety of professionals, commercial publishers, and lay groups are actually involved in curriculum making.

Texts used in program planning in nursing are generally not so vocal or specific relative to participation of interest groups or constituencies. A text by Torres and Stanton (1982) notes that the educational setting, the general public, and the profession impact on the process of curriculum development in nursing. Nursing faculty are subtly encouraged to be bold or even radical in curriculum making, confronting the limits which these factors place on the development or revision of nursing programs. The impact of consumer demands on nursing practice and education is discussed by Bevis (1982). Various clientele of nursing are enumerated, but approaches to utilize these resources are omitted. Ways to obtain data for curriculum development are given, but other than an alumni survey, all address faculty.

Literature Review

The literature relative to participation of interest groups in curriculum development in nursing education is sparse. Tangential material relative to current thought about the role of the consumer in curriculum development in general and curriculum development in higher education in particular was considered pertinent for this study. Writings in nursing practice and education about consumers were also examined.

Several studies about various aspects of citizen participation in curriculum development are reported. Decision making relative to community groups has been studied by Gatza (1973), Moses and Hill (1974), Topoleski (1981), and Halvorsen (1981). Educational researchers have also been interested in the ideas of both parents and educators relative to citizen participation in program planning, implementation, and evaluation. Examples of such investigations are an informational survey used on a continuing basis (Moliterno, 1981), the effectiveness of mechanisms for citizen participation and degree of support for education (Halthorn, 1981), and the utilization of lay participation data (Campo, 1982; Mara, 1962; Tune, 1980).

While the population in the studies which have been cited is elementary and secondary education, concerns about the interface of the public and higher education have also been examined. Thompson (1975) traced the history of citizen influences on higher education. Contemporary interest groups include business, alumni, government, labor, and philanthropic enterprises. The use of regular studies and feedback was studied by Petrick (1979). Berte and Cassella (1979) recommend the establishment of community responsive programs. Two studies that involved obtaining community opinion relative to program effectiveness were completed at the College of the Mainland (MacFarlane & Davis, 1977) and the University of Minnesota (Biggs, 1976).

Nurses practicing in hospitals and other agencies are concerned about client satisfaction with care. Various studies have been undertaken in this area. Examples are a study by Smith (1977) to obtain patient feedback during a time of agency service change, investigations by Woodward and colleagues (1978) and Justice and McBee (1978) to determine the effectiveness of mental health services.

The needs of consumers or patients were tantamount in the 1970s when there was federal involvement in health planning. Consumer participation and representation in health and welfare agencies and community planning groups was mandated. Several investigations were undertaken during this time relevant to the type and effectiveness of such consumer participation. One noteworthy study is reported by Lewis (1980) on client membership of various committees of a nursing service in Wisconsin. With the exception of the audit committee where staff felt they could be less than candid, the results of this demonstration project were increased ability to affect change due to consumer input, change in view of the nursing role by consumers, and increased feelings of mutual respect and colleagality.

Studies which look directly at nursing education and consumer participation in any aspect of curriculum development are few, as indicated previously. Formolo (1979) surveyed clients directly in determining the effectiveness of nursing students in health counseling with older adults and young families. Patient satisfaction with care given by associate degree nursing students was investigated by Davis-Martin (1982). A study of cost and consumer variables relative to a specific teaching methodology in a community college was conducted by the nursing program of the Mount Hood Community College in Oregon (1974). In evaluating the program, the Consumer Advisory Committee to the school provided input about desired outcomes compared with outputs obtained. A large patient group in the community was also asked for input. To the author's knowledge, this is the only research that directly focuses on consumer participation in any aspect of curriculum development in nursing.

Hypotheses

The following classification variables are used in testing hypotheses relative to the amount and use of curriculum information obtained from patients and/or nurse employers: type of school conducting the baccalaureate nursing program, the number of years the baccalaureate program has been in existence, accreditation status, region of the United States where program is located, community size where program is located, student enrollment, type of student admitted, estimated percentage of faculty with formal course work in curriculum development, perceived degree of curriculum expertise of faculty, and percentage of faculty with doctoral degrees. The hypotheses which are tested are:

1. There is no difference in the amount of information obtained from patients in the process of curriculum development relative to selected classification variables.

2. There is no difference in the use of information obtained from patients in the process of curriculum development relative to selected classification variables.

3. There is no difference in the amount of information obtained from nurse employers in the process of curriculum develoment relative to classification variables.

4. There is no difference in the use of information obtained from nurse employers in the process of curriculum development relative to selected classification variables.

In addition to these hypotheses, the informational strategies used to obtain curriculum data from patients and/or nurse employers are subjected to analysis. The following variables are used in this analysis to test hypotheses relative to informational strategies: years in existence as a baccalaureate program, region of the United States where program is located, student enrollment, type of student admitted, estimated percentage of faculty with formal course work in curriculum development, degree of curriculum expertise of faculty, mean years of teaching experience, and percentage of faculty with doctoral degrees. The hypothesis tested is:

5. There is no difference in the use of stated informational strategies in terms of selected independent variables.

Methodology

A questionnaire was developed by the researcher to elicit practices and perceptions of baccalaureate nurse educators relative to patient and nurse employers participation in curriculum development. Information requested included demographic data, faculty background, and curriculum information strategies as well as amount, use, and purposes of information obtained from patients and nurse employers in the process of curriculum development. In order to establish the validity of the instrument, a panel of experts reviewed the tool, and a pilot study was conducted.

Questionnaires were mailed to 477 programs. This study sample was obtained by using a list of baccalaureate programs from the Council of Baccalaureate and Higher Degree Programs of the National League for Nursing. Elimination of programs offering generic master's, master's only, or generic doctorates was done because these programs differ widely in goals, degrees offered, and student population. Thus, the study population was homogeneous in that all programs in this study offered baccalaureate preparation in nursing. Initially, heads of programs were contacted by letter requesting their participation in the study. The researcher asked that the program head or a designee complete the questionnaire. The number of programs participating in the study was 315; this number represented a response rate of 66%.

Data Analysis

After return of the questionnaire, data were compiled for analysis. Frequencies were determined for all items. One-way analysis of variance was used to examine the possible relationships of the dependent variables, the ratings of the amount and use of information from patients and nurse employers, and several independent variables. The chi-square test was used to examine possible relationships between the strategies used to obtain input from nurse employers and/or patients and several variables.

Results and Conclusions

The sample consisted of 315 baccalaureate nursing programs. Respondent programs were evenly divided between public and private institutions. All regions of the United States are represented in the study, as seen in Table 1. More schools in the Midwest were included in the study population.

Table 1

Distribution of Schools by Regions

	Schools	
Area	Number	Percent
North Atlantic	76	24.2
Midwest	100	31.8
Southern	93	29.8
Western	45	14.3

Note. (*N* = 314).

The western area had the least representation. Fifty-nine percent of the schools were in communities with populations of 249,999 or less. About 40% were in the population centers of 250,000 or more. Both old and young programs were a part of the study group. The mean age of the sample programs was 15 years and the median age was 10 years. Although some programs admitted either generic students or Registered Nurse students exclusively, both types of students were admitted to both programs.

Student enrollments in programs varied widely. While a few programs report very low (25 or few students) or very high (more than 1,000 students) enrollments, the size of student enrollments generally were in the range of 100 to 400 students. Table 2 shows the size of schools by student enrollment. The mean enrollment in study programs was 270.

Table 2

Student Enrollments

	Schools	
Number of Students Enrolled	Number	Percent
Lowest-100	65	20.8
101-165	59	18.9
166-270	66	21.2
271-400	62	19.9
401-highest	60	19.2

Note. N = 312.

Faculty in study programs ranged from 2 to 180. The mean number of total program was reported as 25. The size of the faculty in the majority of programs was 100 or less. Most faculty were employed full time. The number of faculty with doctoral preparation in a single school ranged from 1 to 57. Two hundred thirty-nine programs reported having at least one faculty member with doctoral preparation. Only 2 programs reported having more than 50 faculty with doctorates. Although the most frequently reported number of faculty with doctorates was one, the average number of faculty with doctoral preparation was five. The range of estimated percentage of faculty with formal course work in curriculum development was from 2% to 100%. Table 3 shows the estimated percent of faculty with formal course work in curriculum development. Thirty-three respondent programs indicated that all of the faculty have formal course work in curriculum development. In response to the question about the perceived degree of curriculum development expertise of faculty, respondents generally indicated that the level of curriculum development expertise of faculty was sufficient. Specifically, 36% of the respondents perceived the level of curriculum development expertise as fairly extensive. Table 4 shows the distribution

Table 3

Estimated Percent of Faculty with Formal Course Work in Curriculum Development

Estimated Percent of Faculty with Formal Course Work	Schools	
	Number	Percent
Lowest-20	62	22.8
21-40	58	21.3
41-60	50	18.4
61-80	52	19.1
81-100	52	19.1

Note. *N* = 272.

of schools by perceived level of curriculum development expertise of faculty.

Table 4

Perceived Level of Faculty Curriculum Expertise

Level of Expertise	Schools Number	Percent
1 - insufficient	4	1.3
2 - minimal	43	14.2
3 - sufficient	124	40.9
4 - fairly extensive	110	36.3
5 - quite extensive	22	7.3

Note. *N* = 303.

Hypothesis 1, stating that there is no difference in the amount of information obtained from patients in the process of curriculum development in relation to selected independent variables, was rejected. The only significant variable was the degree of perceived curriculum development expertise of faculty as it relates to the amount of information obtained from patients for curriculum purposes.

Hypothesis 2, stating that there is no difference in the use of information obtained from patients in the process of curriculum development relative to selected independent variables, was rejected. The significant variable was the degree of perceived curriculum expertise of faculty as it relates to the use of patient information for curriculum purposes.

Hypothesis 3, stating there is no difference in the amount of information obtained from nurse employers in the process of curriculum development relative to selected independent variables, was rejected. The significant variables were size of program and degree of perceived curriculum development expertise of faculty.

Hypothesis 4, stating that there is no difference in the use of information obtained from nurse employers in the process of curriculum development in relation to selected independent variables, was rejected. Significant variables were degree of perceived degree of curriculum development expertise of faculty and doctoral preparation of faculty.

Hypothesis 5, stating that there is no difference in the use of stated informational strategies and selected variables, was rejected on the basis of the following statistically significant relationships:

1. An advisory committee of nursing service personnel working with the curriculum committee and the variables of years in existence as a baccalaureate program, size of program, type of students admitted, and teaching expertise of faculty.

2. An advisory committee of nursing service personnel working with the school as a whole and the variables of years in existence as a baccalaureate program, geographical area, size of program, and type of students admitted.

3. Faculty obtaining information informally from nurses in the community and the variable of doctorally prepared faculty.

4. Regular, planned discussions being held with clinical agency personnel and the variables of estimated percentage of faculty with formal

course work in curriculum development and degree of perceived curriculum expertise of faculty.

5. Volunteer groups providing formal data by questionnaire or interview and the variable of degree of curriculum expertise of faculty.

6. Patient opinion polls obtained by clinical agencies being reviewed and the variable of years in existence as a baccalaureate program.

7. Information being obtained from persons who have been patients in clinical agencies and the variable of degree of perceived curriculum expertise of faculty.

A review of the findings resultant from this study suggest the following conclusions relative to who participates in curriculum development, strategies used, and practices and perceptions in curriculum development in nursing.

Participants in Curriculum Development

1. The participation of various interest groups in curriculum development in baccalaureate nursing programs tends to be limited. Various types of nursing service personnel and groups outside of nursing include faculty with specific expertise, boards of trust, and personnel in academic affairs are generally involved in curriculum development at a minimal level only.

2. Nursing students tend to be more extensively involved in curriculum development than do practicing nurse alumni and various types of nursing personnel.

3. Supervisors of alumni are generally regarded as important sources of evaluative data and information about program graduates.

Table 5 shows the rankings of informational strategies by frequency of utilization. Clinical agency personnel, as nurse employers, were a valuable

Table 5

Rankings of Informational Strategies by Frequency of Use

	Responses	
Strategies	Number	Percent
Clinical personnel in informal discussion	278	88.5
Informal information from nurses in community	272	86.5
Regular discussions with clinical personnel	234	74.5
Information from supervisors of alumni	218	69.4
Nursing service personnel advisory to school	128	40.8
Mortality/morbidity statistics relative to content	114	36.3
Volunteer groups in class or conference	92	29.3
Formal data from volunteer groups	57	18.2
Information from former patients	56	17.8
Nursing service personnel on curriculum committee	54	17.2
Specific patient needs obtained irregularly	48	15.3
Nursing service personnel advisory to curriculum committee	46	14.6
Review of patient opinion polls	28	8.9
Nursing service personnel and patients advisory to school	26	8.3

Note. N = 314.

source of curriculum information. Information, however, was more often obtained informally. The second most frequently used strategy was obtaining information, again informally, from nurses in the community. Regular, planned discussions with clinical agency personnel was the third most frequently used informational strategy. Such discussions are virtually essential in the implementation phase of curriculum develoment. Approximatley 75% of respondent programs indicated use of this strategy.

Questioning of supervisors of alumni is also a very useful strategy. Approximately 70% of the programs used this strategy. No distinction was made about whether this information was obtained on formal or informal basis. From the literature review and from experience, follow-up studies of graduates often include questionnaires or interviews of supervisors or employers of alumni.

By ranking the informational strategies in order of frequency of use, the place of patient input can be seen clearly. The sixth strategy, used by less than 40% of respondent programs, was the first patient related information source. This strategy involved the use of morbidity and mortality statistics which are patient generated. As seen in Table 5, some use of volunteer groups was evident in the responses. The use of strategies pertaining to volunteer groups was less than 20%. Most frequent use was made, however, of approaches which are planned or systematic. Volunteer groups were more likely to be involved in classes or conferences and to provide information in a formal manner. The approach of having patients involved in a more direct information giving strategy such as serving on an advisory committee was the least used of the informational strategies.

A review of the degree of assistance, as indicated by respondent programs, from selected sources also illustrates these findings. Table 6 shows the perceptions of respondents relative to the degree of assistance

Table 6

Degree of Assistance in Curriculum Development

Sources	Degree of Assistance* (Percentage)				
	1	2	3	4	5
Director of nursing	9.5	33.2	40.5	11.5	5.3
Assistant/associate director of nursing	16.8	32.2	35.3	12.3	3.4
Inservice directors	13.3	32.2	36.0	13.7	3.3
Supervisors	17.1	36.2	35.8	9.6	1.4
Head nurses	14.7	37.1	33.1	13.4	1.7
Staff nurse	17.2	38.4	31.6	10.4	2.4
Clinical specialists	15.1	28.0	34.1	17.6	5.4
Patients	36.0	39.0	19.0	4.2	1.0
Community volunteers (unorganized)	54.1	31.0	11.2	3.7	0.0
Volunteer groups (organized)	47.8	31.2	14.2	4.7	1.8
Nursing students	0.3	2.3	19.8	40.3	37.3
Alumni	6.6	9.1	31.0	35.5	17.8
State Board of Nursing	8.8	16.6	36.8	27.0	10.8
National League for Nursing guidelines	0.0	4.2	14.0	39.6	42.2

*Scale. 1 = none, 2 = minimal, 3 = some, 4 = fairly extensive, 5 = quite extensive.

reported in percents. Approximately 80% of the respondent programs reported at least a minimal degree of assistance in curriculum development from the nurses in various types of positions. The groups of nurses associated with clinical agencies (includes directors of nursing, assistant/associate directors of nursing, inservice directors, supervisors, head nurses, staff nurses, and clinical specialists) did not give extensive assistance in curriculum development. Reports from respondent programs indicated less than 20% assistance at the 4 (fairly extensive) and 5 (quite extensive) ratings for each of the nurse groups. About 18% rated the degree of assistance from clinical specialists at a fairly extensive level. Assistance from patients sources was minimal. Table 6 shows that over 60% of the study participants reported the degree of assistance in curriculum develompent from was none or minimal. The degree of assistance reported from patients decreased as the scale increased in the degree of assistance. Volunteers from the community and organized volunteer groups were not widely utilized as sources of assistance.

Programs, however, receive assistance from both nursing students and alumni. In rating this degree of assistance, the majority of the respondents indicated that this assistance is fairly extensive. Most of the ratings for nursing students were at the top end of the scale in degree of assistance given. More than 75% of the respondents indicated that the degree of assistance from nursing students in curriculum development was either fairly or quite extensive. Although the most frequent rating for both nursing students and alumni was fairly extensive, the ratings for alumni clustered around 3 (some) and 4 (fairly extensive) on the scale. Approximately 36% of the respondents indicated the degree of assistance from alumni was fairly extensive, while 31% reported that there was some degree of assistance from this group. Nursing students tended to give more assistance in curriculum development than alumni who are, for the most part, practicing nurses.

Strategies Used in Curriculum

1. Advisory committees are usually composed of nursing service personnel and tend to work with the school as a whole rather than with the curriculum committee.

2. Assistance from state boards of nursing and National League for Nursing guidelines tends to be regularly used; guidelines from the National League for Nursing are generally viewed as giving more extensive assistance than state boards of nursing.

3. More curriculum information appears to be generated on an informal basis than through the use of formal approaches.

4. Faculty who possess more curriculum expertise are more likely to use the informational strategies of regular and planned discussions with clinical agency personnel, volunteer groups providing formal data by questionnaire or interview, and information being obtained from former patients.

5. The larger the school, the less likely are advisory committees to work with either the school as a whole or the curriculum committee.

6. The longer the school has been in existence, the less likely the school is to utilize the informational strategies of review of patient opinion polls, and advisory committees of nursing service personnel working with the school or the curriculum committee.

7. School admitting only Registered Nurses (R.N.) students tend to make more use of advisory committees working with the school or the curriculum committee than do schools which admit both generic and R.N. students or schools which admit generic students only.

8. Schools in the western and southern area of the country seem more inclined to use an advisory committee working the school as a whole as a strategy for obtaining curriculum information.

9. Faculty with formal course work in curriculum development seem to positively influence the more frequent use of regular, planned discussions with clinical agency personnel as an informational strategy.

Practices and Perceptions in Curriculum Development

1. While both patient and nurse employer participation in curriculum development tends to be minimal, the amount and use of information obtained from nurse employers tend to be greater than the amount and use of patient generated information.

2. The higher the degree of curriculum development expertise of the faculty, the greater is the tendency to obtain and utilize both patient and nurse employer information in the process of curriculum development. Doctoral preparation of faculty also seems to enhance the amount and use of information generated from nurse employers.

3. Although nurse employer information appears to have more inpact in accomplishing specific purposes than patient information, data from both sources tend to be more useful in relation to realism in the curriculum, public relations of the program and/or nursing, and the opportunity to exhange ideas and information.

Recommendations

The following are offered for consideration to improve the quality of curriculum in nursing education:

1. Information on practices and perceptions of associate degree nursing educators relative to patient and nurse employers participation in curriculum development is needed to more adequately determine the most effective roles for curriculum participants and strategies for improving the curriculum.

2. Alumni represent a rich resource of information which could improve the quality and quantity of curriculum information, and further investigation of ways to utilize most effectively the contributions of alumni is needed.

3. Additional study of the use of consultants in curriculum development in nursing education should be initiated since consultants frequently participate in curriculum activities, yet little is known about the content and process of the consultative role. Documentation of the consultant as a curriculum participant would be useful in providing knowledge about the best utilization of this person in the curriculum design process.

4. Further study of the adequacy of levels of participation of various interest groups is needed to insure maximum effectiveness in obtaining and utilizing information from different curriculum participants.

5. Study of the differences and/or benefits of patient and/or nurse employer participation in the curriculum development process is needed to establish the validity of this approach and its value in affecting the quality of program graduates.

6. There is a need to establish a framework for data collection to assure systematic gathering of needed curriculum information. Such a framework would facilitate the use of research-based models and would increase the likelihood of curriculum planning based on a more accurate data base.

7. Since patients are the raison d'etre of nursing, communication with patients about needs relative to health and illness care is essential to viable nursing curricula, and additional study is needed to increase the participation of patients in curriculum development activities in nursing education.

8. Efforts should be made to determine the curriculum development expertise of faculty and to provide assistance in developing the knowledge and skill which faculty need to aid nurse educators in developing broad-based and responsive curricula.

9. Since advisory committees provide an approach to patient and/or nurse employer participation in curriculum development, additional knowledge about the role and ways to increase effectiveness of such groups would enhance the productivity of this strategy in obtaining curriculum information.

10. Nursing programs without advisory committees should consider the potential contribution of such committees to program development, and where such advisory committees exist, patient/consumer members should be included.

11. Serious and concerted efforts to enlist patient/consumer participation in curriculum development activities should be initiated, including the development of collaborative efforts with nursing service to

increase patient/consumer involvement in areas of natural interest relative to patient education.

12. Ways to increase the effectiveness of the contribution of nursing service personnel in the process of curriculum development should be explored, and involvement of nursing faculty as the primary persons in curriculum development should be sustained.

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